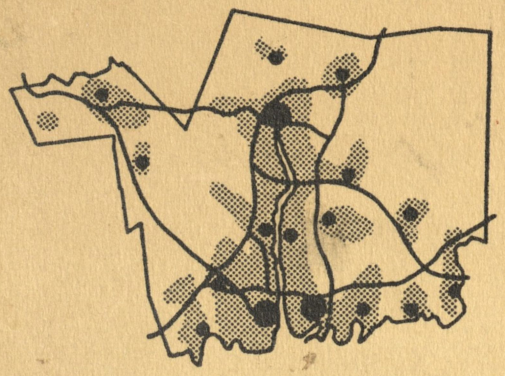

Regional Plan Implementation Study

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RECOMMENDED REFUSE DISPOSAL PLAN

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Prepared for the
SOUTHEASTERN CONNECTICUT REGIONAL PLANNING AGENCY
by
METCALF & EDDY, Engineers-Planners

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286320

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Southeastern Connecticut Regional Planning Agency
139 Boswell Avenue
Norwich, Connecticut

Attention: Mr. Frank Leigner, Jr., Chairman

Gentlemen:

Pursuant to Articles of Agreement dated August 3, 1966, we have investigated the existing refuse disposal situation and future needs of the Southeastern Connecticut Region. Through our analysis of local, subregional, and regional alternative approaches to the refuse disposal problems, we have recommended a long-range refuse disposal plan for Southeastern Connecticut.

Our technical report together with a summary of major findings and recommendations is transmitted herewith.

Respectfully submitted,

METCALF & EDDY

/s/ C. Y. Hitchcock, Jr.

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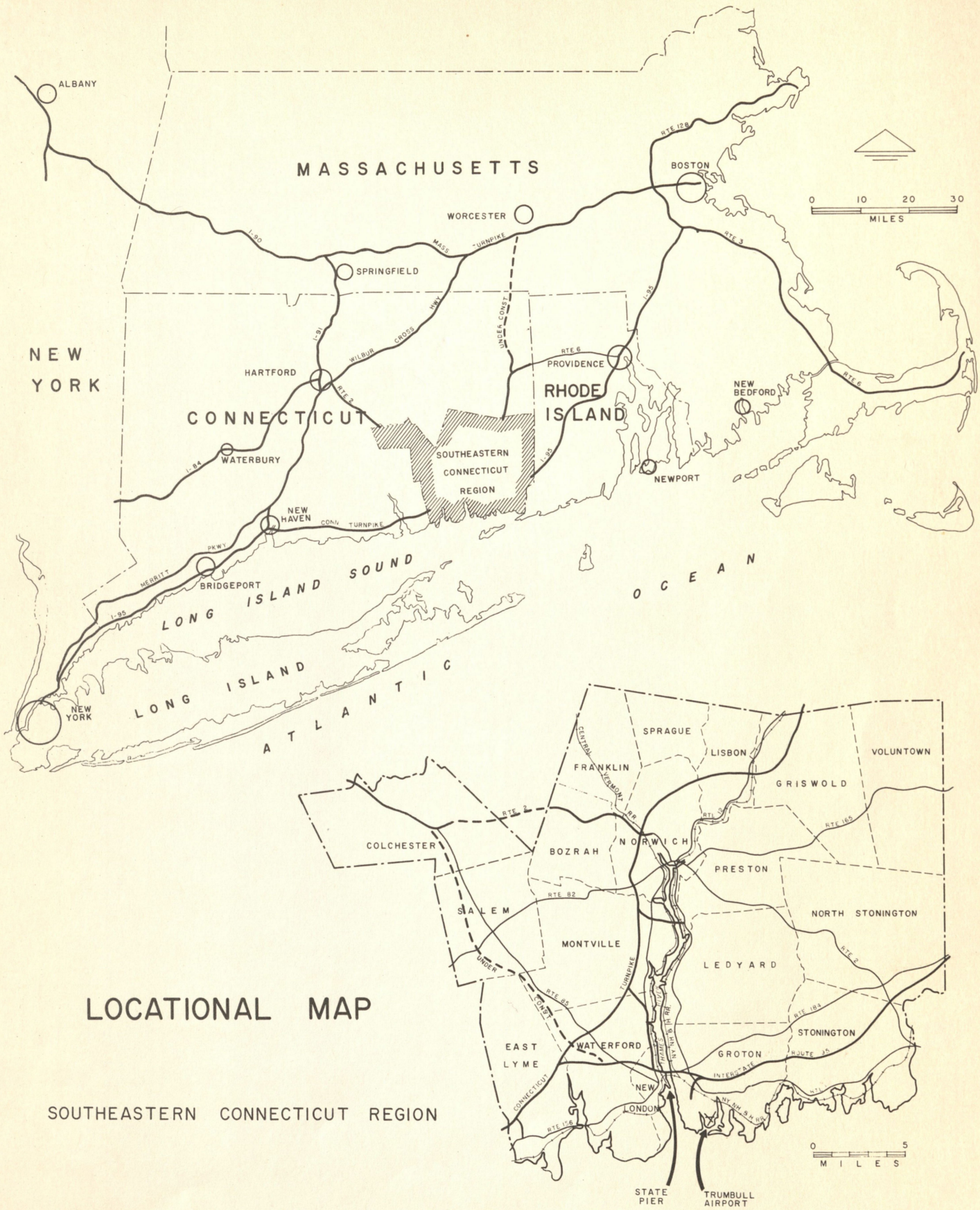

LOCATIONAL MAP

SOUTHEASTERN CONNECTICUT REGION

PREPARED BY THE SCRPA STAFF - 1967

FIGURE 1

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

Based on our investigations, we present the following summary of our major conclusions and recommendations.

1. There are 19 municipal refuse disposal facilities in the Southeastern Connecticut Region serving 16 municipalities (including Jewett City).*

2. Two municipalities, Griswold, outside of Jewett City, and Franklin, do not maintain municipal refuse disposal facilities but make arrangements for refuse disposal outside the region.

3. There is one municipal incinerator serving the City of New London.

4. There are five sanitary landfills (East Lyme, Groton, Ledyard, Norwich, and Sprague). There are seven modified sanitary landfills (Montville, New London, Preston, Salem, Stonington, Voluntown, and Waterford), and there are six open dumps.**

5. There are four contract refuse disposal facilities, two piggeries, one of which includes an open dump, and two open dumps.

6. Existing ordinary refuse quantities for 1966 were as follows:

	Tons per year
Disposal at municipal facilities	137,681
Disposal at contract facilities	7,428
Disposal at private facilities	14,010
Disposal outside of region	1,874
Total	160,993

7. In addition to the ordinary refuse quantities, the following quantities of special refuse types are being produced in Southeastern Connecticut:

Junk automobiles	-	7,800 in 1965
Fly ash	-	46,500 tons in 1965

* This total does not include Colchester, which was added to the Southeastern Connecticut Planning Region in June, 1967 and will be studied separately.

** These classifications are based on our field survey in October, 1966 and on some up-dated information supplied by the State Health Department in December, 1967.

8. Municipal refuse collection service is provided in only three municipalities (New London, East Lyme, and Waterford) and four special districts within municipalities (Jewett City, City of Groton, Norwich City Consolidated District, and the Pawcatuck Fire District).

9. Contractor collection service is provided in three special districts (Jewett City, Mystic Fire District and the Stonington Fire District).

10. All other collection is by private scavengers or on an individual basis.

11. The average annual costs for operating refuse systems in Southeastern Connecticut are as follows:

	Per capita	Per ton
Average collection costs	$3.75	$5.82
Average disposal costs	0.95	1.66
Average collection and disposal costs	$4.70	$7.48

12. Estimated future refuse quantities are as follows:

	Tons	
	1980	1990
Municipal disposal facilities	224,600	324,100
Contract facilities	8,000	8,000
Private facilities	22,400	35,700
Outside region	-	-
Total	255,000	367,800

13. Based on our evaluation of existing disposal methods, remaining capacities of disposal facilities, locations of sites with respect to future land use and development potential and physical characteristics of the existing municipal disposal facilities, the following are recommended for abadonment by 1970:

Bozrah refuse disposal facility
Jewett City's Old Borough Dump
Lisbon refuse disposal facility
North Stonington refuse disposal facility
Stonington refuse disposal facility
Montville refuse disposal facility
Waterford refuse disposal facility
Norwich's Hollyhock Island refuse disposal facility

14. The Salem and Preston refuse disposal facilities'

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Contract facilities	8,000	8,000
Private facilities	22,400	35,700
Outside region	-	-
Total	255,000	367,800

13. Based on our evaluation of existing disposal methods, remaining capacities of disposal facilities, locations of sites with respect to future land use and development potential and physical characteristics of the existing municipal disposal facilities, the following are recommended for abandonment by 1979:

Norwich refuse disposal facility
Jewett City's Old Borough Dump
Lisbon refuse disposal facility
North Stonington refuse disposal facility
Stonington refuse disposal facility
Montville refuse disposal facility
Waterford refuse disposal facility
Norwich's Holly Brook Island refuse disposal facility

14. The Salem and Preston refuse disposal facilities'

capacities will be depleted by 1980.

15. The following facilities are capable of continued use through 1990 with moderate corrections in the disposal methods:

    Ledyard refuse disposal facility
    Jewett City's Burdick facility
    Norwich's Corning Road facility*
    Voluntown refuse disposal facility

16. Groton's existing facility (including the recently purchased adjacent land), East Lyme's existing facility (including the adjacent land under option for purchase), Sprague's facility and the Bates Woods facility in New London are capable of continued use through 1990.

17. The New London incinerator has the available capacity to meet the estimated 1990 demands. However, due to its age and lack of modern equipment, its economic operation at more than two shifts per day is questionable. Its replacement, therefore, at some time during the planning period is anticipated.

18. Alternative plans for solving Southeastern Connecticut's refuse disposal problems have been developed generally considering the following factors:

    a. Availability of suitable sites, including land use considerations.

    b. Political implications.

    c. Costs.

    d. Flexibility of solutions.

19. The basis of the recommended refuse disposal plan is the Regional Plan of Development adopted May 17, 1967 by the Southeastern Connecticut Regional Planning Agency.

20. Four alternative plans for the disposal of ordinary refuse have been investigated and are identified as follows:

    Alternative Plan No. 1 - The Total Regional Plan

    Alternative Plan No. 2-A - Subregional Refuse Systems with Central Incineration Only

---

* This facility's accessibility is poor and its location is in conflict with adjacent residential land uses, even though it is physically suitable for continued use.

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Alternative Plan No. 2-A - Subregional Refuse System with Central Incineration Only

* This facility's accessibility is poor and its location is in conflict with adjacent residential land uses, even though it is physically suitable for continued use.

Alternative Plan No. 2-B - Subregional Refuse Systems with Central Incineration and Regional Sanitary Landfills

Alternative Plan No. 3 - Municipal Plan.

21. Cost comparisons indicate that Alternative Plans 2-B and 3 are the least expensive, averaging $11.80 and $11.85 per ton annually over the 20-year period, 1970 to 1990. Alternative Plans 1 and 2-A average $14.80 and $13.05 per ton, respectively, over the same period.

22. The use of transfer stations was investigated and incorporated into Alternative Plan 2-A. Their use was found to be not warranted.

23. The timing of plan implementation under Alternative Plans 2-B and 3 is best suited to the needs of the individual towns.

24. Alternative Plan 2-B favors the small towns while generally being advantageous to the central cities. Alternative Plan 2-A favors the central cities to the detriment of the small towns.

25. Disposal of bulky wastes is presently inadequate in all Southeastern Connecticut municipalities. We recommend the use of shredder equipment for the disposal of bulky wastes to be operated either on a total regional or subregional basis.

26. The following subregional systems for refuse disposal are recommended for development according to the dates stated:

Bozrah-Franklin Subregional Sanitary Landfill - Immediately (1970)

Lisbon-Griswold-Jewett City Subregional Sanitary Landfill - Immediately (1970)

Ledyard-Preston Subregional Sanitary Landfill - Immediately (1970)

Stonington-North Stonington Subregional Sanitary Landfill - Immediately (1970)

New London-Waterford Subregional Incinerator - Immediately (1970) and 1980.

27. We recommend that the following individual municipal disposal facilities be developed through continuation, conversion and continuation, or expansion and continua-

tion of existing operations or through the development of a new facility according to the dates stated:

East Lyme Sanitary Landfill, through 1990
Groton Sanitary Landfill, through 1990
Groton Incinerator - 1972
Montville Sanitary Landfill - Immediately (1970)
Norwich Incinerator and Sanitary Landfill - Immediately (1970)
Salem Sanitary Landfill - Immediately (1970) and 1978
Sprague Sanitary Landfill, through 1990
Voluntown Sanitary Landfill - Immediately (1970)

28. We recommend that a regional shredder(s) be developed for the disposal of bulky wastes (including junk automobiles) in Southeastern Connecticut. A demonstration project under the federal 1965 Solid Waste Disposal Act is proposed for carrying this recommendation from initial planning through final construction.

29. The Southeastern Connecticut Regional Planning Agency should be the agency to initiate plan implementation, i.e., encourage the formation of the appropriate subregional groups for the proposed subregional incinerator and sanitary landfills; and undertake, with State financial assistance, the required studies and investigations on regional bulky waste disposal.

30. Under Chapter 105, Title 7-330-339L, the subregional plans must be implemented either through the formation of a Municipal District or a Metropolitan District or through Interlocal Agreements.

31. The actual operation of subregional refuse systems under the required legal authority could be in one of two possible manners. Either the municipality in which the disposal facility is located acts as host and charges the participating municipalities on a per ton basis; or all participating towns would form an authority for operating the entire system, to be financially supported on an equitable basis. Final choice between these systems should consider locations of possible sites and should strive for simplification in organization.

INTRODUCTION

During the past several years, the disposal of solid wastes, ranging from garbage to abandoned automobiles, has become one of the most pressing and persistent problems facing municipal government in Southeastern Connecticut. Each day of the year, the region's local governments must find some way to dispose of an average of 441 tons of ordinary household, street, and industrial refuse. In addition, on an average day 22 junked vehicles and 147 tons of fly ash present special disposal problems.

Can this growing heap of rubbish be disposed of more adequately by new methods? Does incineration offer an economically feasible means of disposal in growing suburban towns? Can economies be realized by combining disposal facilities to serve more than one community? These and related questions are investigated in this report, which is the first of a series of studies designed to provide a basis on which to implement the Regional Development Plan for Southeastern Connecticut adopted 17 May 1967.

The report has been prepared by Metcalf & Eddy, consulting engineers and planners. Their work began with a study of the region's existing refuse disposal practices in the fall of 1966. The proposals contained in the report are recommendations of the consultants. These recommendations will be discussed with each of the communities in Southeastern Connecticut prior to the adoption by SCRPA of a recommended plan for refuse disposal.

PART I

EXISTING REFUSE SITUATION

DEFINITIONS AND AVAILABLE REFUSE DISPOSAL METHODS

DEFINITIONS

Several terms, the meanings of which are a prerequisite to the understanding of this report, are defined as follows:

Refuse: (From the Connecticut Public Health Code) - "Refuse means all putrescible and nonputrescible solid wastes, including garbage, rubbish, ashes, and solid commercial and industrial wastes but excluding human or animal intestinal wastes." In this report, refuse is any solid waste. The kinds of refuse are garbage, rubbish, ashes, street refuse, dead animals, abandoned automobiles, industrial wastes, demolition wastes, construction wastes, sewage solids, and hazardous or special wastes.

Garbage: Organic waste material resulting from the handling, preparation, cooking, and serving of foods.

Rubbish: Combustible and noncombustible solid wastes from homes, stores, and institutions. Combustible rubbish is organic but not ordinarily putrescible and may be stored for a long time without becoming a nuisance. Noncombustible rubbish is the inorganic component of refuse, such as tin cans, glass, metal furniture, etc. In addition, there is yard rubbish, such as trees, twigs, grass, leaves, etc.

Ashes: Ashes are the residue from wood, coal, or other material burned in houses, stores, institutions, and industrial establishments.

Street Refuse: All material from street cleaning and the contents of public litter receptacles. It includes paper, dirt, sand, leaves, and the like.

Dead Animals: Animals that die naturally or from disease or are accidentally killed. Condemned animals or parts of animals from slaughterhouses or similar places are not included here but are classified as industrial wastes.

Industrial Refuse: Solid wastes from factories, processing plants, and other manufacturing enterprises. Refuse includes process scrap and rejections, waste by-products, putrescible garbage from food processing plants and slaughterhouses, condemned foods, building rubbish, cinders from power plants,

shipping materials, and other manufacturing refuse.

Demolition Waste: Waste material from razed buildings or other structures.

Construction Refuse: Waste material from construction, remodeling, and repair of houses, commercial buildings, and other structures.

Abandoned Vehicles: Abandoned vehicles, including automobiles, trailers, trucks, etc., that have been left on streets and in public places and that no longer have any useful value.

Sewage Solids: Includes screened solids and grit from sewage treatment plants, sewage sludge, and pumpings from septic tanks and cesspools. These last wastes are explicitly excluded by the American Public Works Association from its listing of solid wastes. However, they are included here because they are handled in some towns as solid wastes.

Hazardous or Special Wastes: Included here are waste materials that present unusual disposal problems or that require special handling. Examples of such wastes are bulky materials, such as tree stumps, old refrigerators, etc., pathological wastes, radioactive wastes, and special wastes that are explosive in large quantities.

AVAILABLE REFUSE DISPOSAL METHODS

Numerous refuse disposal methods have been in practice since the founding of cities. Scientific and technological advances, however, have resulted in only three methods for general refuse disposal which are available and should be considered as satisfactory today. These are sanitary landfill, composting, and incineration (with sanitary landfill for disposal of the residue). Methods for handling or processing special refuse types are available and acceptable. These include hog feeding (garbage), garbage grinding (garbage), salvage and reclamation (special types of refuse with value as salvage), on-site incineration, and shredding. Other methods of disposal that are not acceptable, although in use at the present time in Southeastern Connecticut, are open dumping and burning.

The key to successful disposal of municipal refuse is proper operation of the chosen method. Regardless of the appropriateness of a specific method, if the facility is not operated in a scientifically controlled manner, the disposal will be unsatis-

factory, with resulting health and sanitation problems.

Sanitary landfill is the deposition and compaction of raw refuse, both combustible and noncombustible, in layers and the daily covering of this refuse with a compacted layer of earth. There are three basic steps in the sanitary landfill method of refuse disposal: (1) the dumping of the refuse by the collection vehicle; (2) the compaction of the dumped refuse by a tractor-type machine of suitable weight; and (3) the daily covering and compaction of refuse with earth. Figure 2 is a schematic diagram showing a typical sanitary landfill operation.

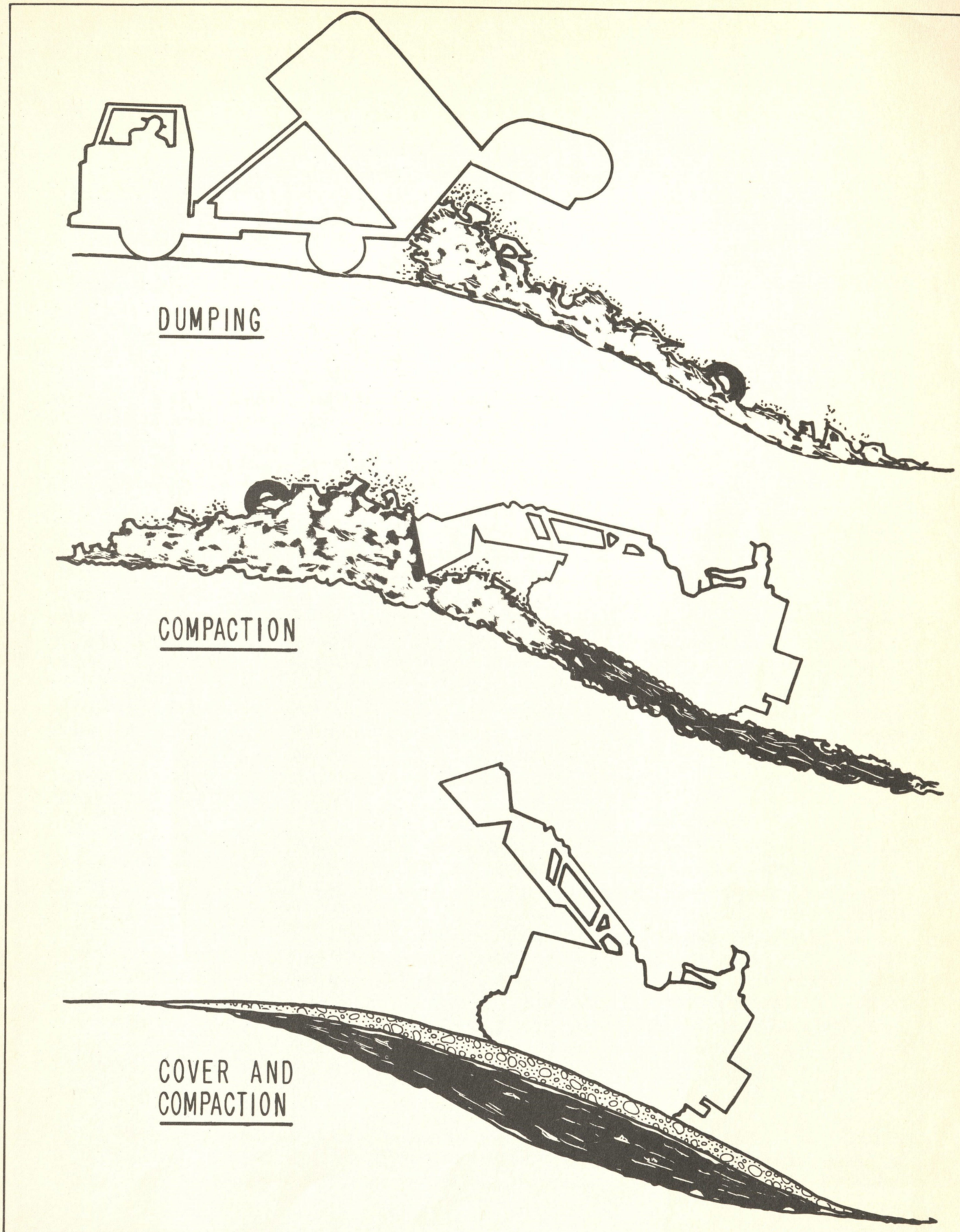
Most types of refuse can be disposed of in a sanitary landfill, either in the same state in which collected or after some preparation process. It is desirable to separate special types of waste, such as bulky materials, at the disposal site.

Sanitary landfill, although usually the least expensive of the three methods, has some disadvantages. An important consideration is the fact that cover material is not available on-site at many otherwise suitable landfill locations; it has to be trucked at some expense. Another factor is that dumping space required for sanitary landfill is several times that needed for the disposal of the incinerator residue and noncombustibles.

Sanitary landfill has other limitations. Unless rigorous supervision is maintained, it will decline to an open dump. Successful operation requires constant attention to many details, continuous painstaking diligence, and constant engineering supervision.

Composting is a process for the biological decomposition and stabilization of organic matter found in municipal refuse. Metals and similar foreign material are either removed or ground into fine particles and carried along into the end product. Composting of municipal wastes has been economically successful in some parts of the world. However, in this country, this method of refuse disposal and reclamation has been marked by failures. Any successful refuse disposal process must be the most economical for its application. The economic future of composting in the United States does not appear promising.

Several types of composting plants have been built or proposed. The estimated costs of operation have indicated that the yearly costs of fixed charges plus operating costs are, in general, equal to or slightly greater than those for municipal incinerators of the same capacity. The economy of the composting process is directly related to the ability to sell the end product, which is a good, low-value soil conditioner. This requires the development of an established market for the product which, in competition with commercial fertilizers, is difficult to develop, especially in the eastern part of the country. If not sold, the composting residue must be given away or disposed of



SOUTHEASTERN CONNECTICUT REGIONAL PLANNING AGENCY

This chart is part of a comprehensive planning program being carried out in part with an Urban Planning Grant from the Department of Housing and Urban Development, under the provisions of Section 701 of the Housing Act of 1954, as amended, and with the financial participation of a State Regional Planning Assistance Grant administered by the Connecticut Development Commission.

TYPICAL
SANITARY LANDFILL OPERATION

Metcalf & Eddy Engineers & Planners Boston New York Palo Alto San Francisco

FIGURE 2

NOVEMBER, 1967

as landfill. The final product amounts to about 50 percent of the raw refuse by volume.

For satisfactory decomposition, a certain minimum ratio of organic primary garbage to inorganic and nongarbage material is necessary. In municipal refuse, the present trend indicates larger quantities of paper products and smaller quantities of garbage, or the reverse ratio of what is desirable for optimum compost process.

Records indicate that between 1959 and 1964 the number of farms in New London County* decreased from 1,359 to 913 and that the acreage of farm land decreased from 160,000 acres to 121,000 acres. With this trend, it appears that a market for compost material would be very limited.

Based on the preceding discussion, disposal of refuse by composting is not recommended for Southeastern Connecticut.

Incineration is the disposal of as much refuse as possible in furnaces at temperatures generally from 1300 deg. F. to 2000 deg. F. Not all of the refuse material can be disposed of in this manner. What remains after incineration (called residue) must be disposed of in a sanitary landfill. Also, noncombustibles, such as scrap metal, broken concrete, and similar materials, should be deposited directly in the fill area. Some large combustible objects, such as tree stumps, should also be deposited directly in the dump area or shredded. All garbage, paper, tin cans, rags, bottles, plastics, etc., are handled in the modern incinerator furnace. This completely eliminates the presence of odor, flies, vermin, smoke, and other nuisances associated with dumps.

Incinerator design has advanced materially in the last decade. The adaption of continuous feeding, mechanical and automatic stoking, and the provision for fly-ash collection have resulted in increased efficiency and greater reliability with less nuisance. With the present extensive use of paper packaging, there is no need for auxiliary fuel in order to operate furnaces well above deodorizing temperatures, so that odors and smoke are completely burned before the gases emanate from the stack. With increasing public awareness of air pollution, fly-ash discharge from a stack must be controlled, but provision can now be included, although at some increase in cost, to satisfy air pollution control codes.

Sanitary conditions can be maintained throughout the plant. All refuse for the incinerator would be deposited in the storage bin, and no supervision should be necessary. Most of the time,

---

* All eighteen Southeastern Connecticut towns plus the Towns of Lyme, Old Lyme, and Lebanon constitute New London County.

the refuse would be incinerated on the same day that it is collected. These are distinct advantages over sanitary landfill.

Land requirements for incineration, including space for residue disposal, are relatively small. Weather generally does not affect operations. Collection hauls can be shorter* than for landfill. There is heat produced that can be recovered and converted to some sort of power if so desired. These are some other advantages of central incineration.

The major disadvantage is cost. Disregarding possible differences in land values, capital investment and operating costs are significantly higher than for sanitary landfill.

In general, municipal refuse disposal by incineration is practical only when serving a large number of people, as in urban areas or on a regional basis. Except under special conditions, a minimum of 30,000 to 40,000 population should be required to support incineration.

The process of incineration is diagrammed schematically on Figure 3. A typical incinerator plant would consist of an adequate concrete storage bin into which large trucks would dump directly or into which the contents of smaller refuse cans could be emptied. A traveling bridge crane would transfer the refuse from the storage bin to the feed hopper of the furnace. The furnace shown is a modern continuous-feed, mechanically stoked type having a traveling grate stoker with adjustment for speed according to the refuse being burned. The furnace enclosure would be completely refractory lined with suspended arch roof. Underfire air and overfire air would be provided. The residue would be continuously discharged into a continuously operating quenching tank and conveyor system having a flight conveyor to lift and discharge residue into a truck body. The building would be of fire-resistant construction, well ventilated, and containing toilets, offices, and lunchrooms as desired. Truck scales would be provided for recording quantities delivered.

Fly-ash removal provisions would be included between the furnaces and the chimney. Heat-recovery provisions are not shown in this example. The residue, consisting principally of ash and tin cans, can be completely sterile and makes a good landfill. The quantity of residue is about 20 percent of the raw refuse by weight and about 12 percent by volume. Assuming the disposal of bulky wastes directly at the landfill site without prior incineration, any given disposal area would last three to four times as long with the incineration disposal method as it would with sanitary landfill.

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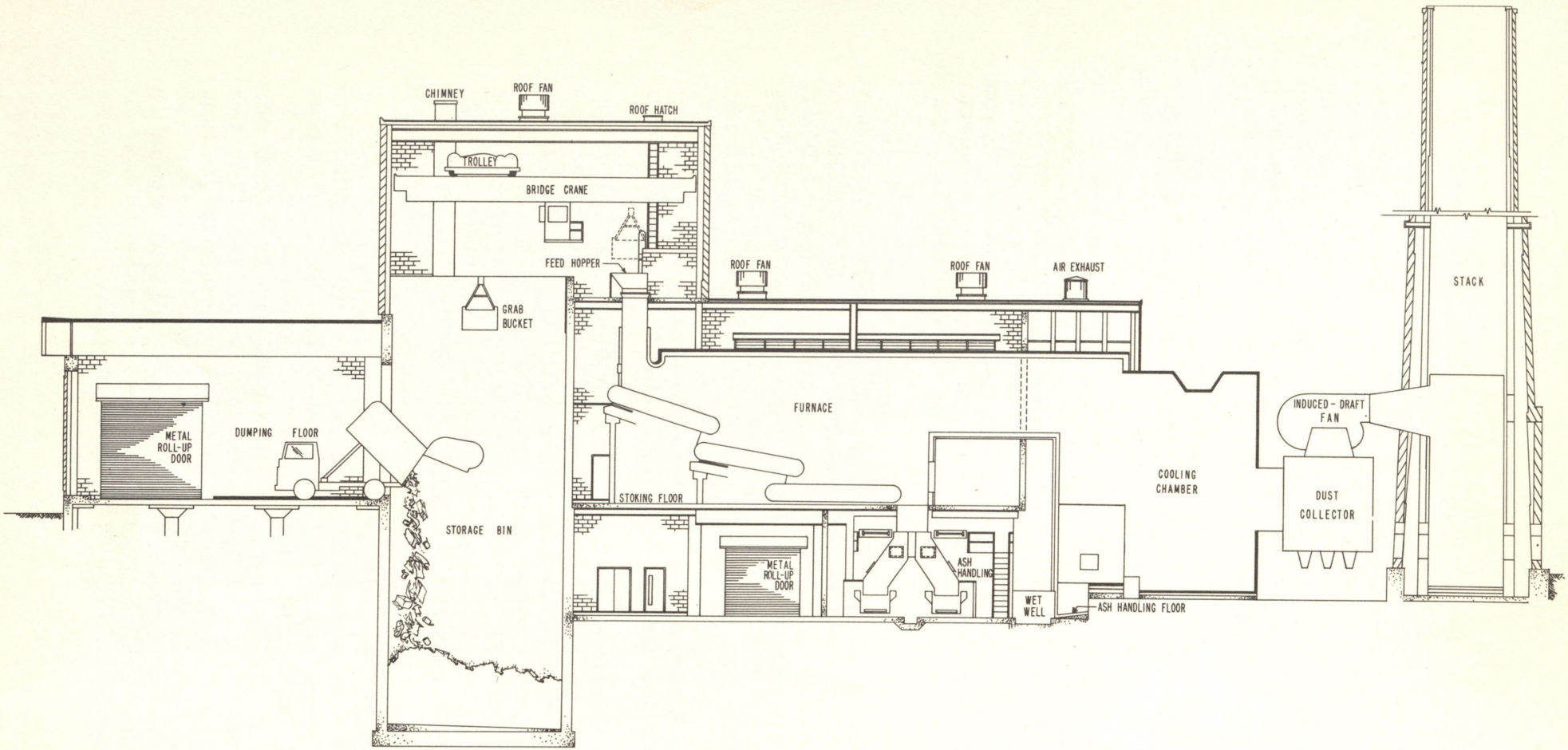
* Shorter hauls are usually possible because incinerators can be located in industrial areas closer to the centers of population.



This drawing is part of a comprehensive planning program being carried out in part with an Urban Planning Grant from the Department of Housing and Urban Development, under the provisions of Section 701 of the Housing Act of 1954, as amended, and with the financial participation of a State Regional Planning Assistance Grant administered by the Connecticut Development Commission.

SOUTHEASTERN CONNECTICUT REGIONAL PLANNING AGENCY

SCHEMATIC DIAGRAM OF MODERN INCINERATOR

FIGURE 3

NOVEMBER, 1967

Research is active in the field of solid wastes disposal, and further advances may be expected. High-temperature incineration is a method that may become practical and efficient as a general disposal method in the future. This method operates at temperatures in excess of 3000 deg. F. Under research conditions, reduction of refuse to 3 percent of its original weight has been achieved. Although this is certainly outstanding, many questions, including those regarding economics and reliability, must be answered before this method becomes acceptable.

Special disposal methods include garbage grinding, on-site incineration, hog feeding, shredding, salvage, and dumping at sea.

Garbage grinding can be either centralized or on an individual basis. The grinders reduce garbage to a slurry-type residue that is flushed into public sanitary sewers. Centralized grinding requires that garbage be separated from other refuse, which reduces the weight of all refuse by some 10 to 15 percent. Although relatively simple to build and operate, central grinding stations result in increased loads on sewage treatment plants.

On-site incineration is used to reduce combustible refuse to a residue approximately 25 percent of the original amount by weight (10 to 15 percent by volume). On-site incinerators are found in private houses, apartments, stores, industries, hospitals, and other institutions. If constructed and operated properly, on-site incinerators can greatly reduce the municipal refuse disposal requirements, although they are usually large contributors to air pollution. In this plan, we do not anticipate that on-site incineration will significantly affect the over-all refuse disposal needs in Southeastern Connecticut.

Hog feeding as a method of garbage disposal has lost much popularity in recent years. Public health requirements now permit edible garbage only, which must be cooked prior to hog feeding. Because of haul distances and the need to separate and cook garbage, its marketability is declining. It is, however, still a reasonable disposal method for use by restaurants and institutions, provided that the piggery is remotely located and well operated.

Shredding is the process of reducing bulky wastes by crushing and/or cutting to a quantity of cut fragments that are small in size and capable of handling and disposal by other methods. The principal use of this method has been directed toward the disposal of junk automobiles and bulky metal wastes, such as old refrigerators, stoves, washing machines, etc. All bulky wastes, including nonmetallic wastes, can be fed into a shredder. The ferrous metals can be separated magnetically and sold as scrap metal. The economic use of this method has been limited to those areas where significantly large quantities of bulky wastes, primarily made of salvageable metal, can be obtained.

Salvage is the separation of certain waste materials that have re-use value. Also included would be the waste heat utilization from incinerator furnaces. The recent trend has been toward lower market values for certain refuse items, such as wastepaper, glass, rags, scrap metals, etc. This, coupled with the costs of separating salvageable materials and with the smaller quantities of salvageable materials, has greatly limited the use of salvage as a disposal method in this country.

Waste heat utilization from incinerators has been carried out sparingly in this country in the past. Where sewage treatment plants have digesters, methane gas is available for use as a fuel to produce power for operating mechanical equipment. Where sewage treatment plants do not have digesters, incinerator waste heat could be utilized to produce steam for powering mechanical equipment such as bulky refuse shredders. Also, incinerator flue gases may be used for drying sludge prior to incineration. Such situations could be more frequent in the future.

As the disposal needs of solids contaminated by radiation increase with the greater use of nuclear energy and as more widespread uses of radiation are found, a satisfactory reclamation operation for radioactive materials appears to be a desirable possibility.

The potential use of solids contaminated by radiation as a source of useful radioactivity is a subject that is receiving increasing attention but that is now only in the early research stage.

Dumping at sea as a disposal method for general refuse is illegal at present. Prior to 1933, several seacoast cities, principally in New Jersey and New York, used this disposal method for general raw refuse. In 1933, however, the United States Supreme Court prohibited sea disposal in a decision involving New York City.

Although illegal in its 1933 form, limited research and experimentation is underway today. Consideration has been given to incinerator ships, open burning in barges, and packaging in special containers before dumping. At the present time, an acceptable procedure for disposal at sea has not been found. However, its future use should not be ruled out, especially for the portions of Southeastern Connecticut adjacent to navigable waters.*

* There is a small amount of special waste disposal by this method at the present time in Southeastern Connecticut.

STATUS OF REFUSE PLANNING

Only recently has public awareness of the refuse disposal problem reached the point at which responsible agencies are being compelled to incorporate long-range plans for refuse disposal facilities into the total comprehensive plans for the development of communities.

The seventeen municipalities in the Southeastern Connecticut Region have been typically inactive in refuse planning, especially long-range planning. Only New London, North Stonington, and Groton have determined long-range refuse disposal needs and have developed the plans to take care of the problem on a town basis.

The New London Comprehensive Plan has just been completed. Based on the population projections in this plan, an estimated 20,904 tons of refuse would be collected in the year 2000. This quantity of refuse would require the existing incinerator to operate 13.4 hours per day on a six day a week, year-round basis. The plan, therefore, states that the present incinerator will be operating within its design capacity in the year 2000.

In North Stonington's Comprehensive Plan of Development, it is estimated that by 1990 the total annual volume of refuse produced in the town will be 22,000 cu. yd. compacted.* A 30-acre site along Route I-95 is recommended for the location of a new town sanitary landfill, which should meet the town's needs over the next 25 years.

Groton's Department of Public Works has been conscious of the refuse disposal problem over the past several years. In 1964, the Department of Public Works prepared a preliminary incinerator report which concluded that the town should operate its sanitary landfill for several years before making any final judgment as to its relative merits as a refuse disposal method. Recently, the Department of Public Works purchased an additional 88 acres of land for expanding its sanitary landfill operation, indicating its long-range thinking toward continued sanitary landfill operation over the next 10 to 15 years.

Although no specific plans have been prepared in any other towns, certain ideas have been mentioned which should be noted.

Norwich's sewage treatment plant was designed for the addition of an incinerator and the utilization of its generated heat.

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* The basis for this refuse volume estimate is the 1990 town population of 11,000, which was forecast as part of the Comprehensive Plan study.

Ledyard's Comprehensive Plan of Development (1964) recommends that the town's refuse disposal method be sanitary landfill, that the location be in an industrial zone, and that the land be reclaimed for eventual industrial use.

Waterford's Comprehensive Plan (1964) states that incineration is the most satisfactory solution for refuse disposal and that the town should consider joint disposal with Montville. A possible location was suggested on the north side of the Industrial Triangle.

INVENTORY OF PRESENT REFUSE COLLECTION AND DISPOSAL PRACTICES*

CLASSIFICATION OF REFUSE DISPOSAL FACILITIES

For purposes of this report, refuse disposal facilities have been grouped according to the basis for service into three classifications: municipal facilities, contract facilities, and private facilities.

Municipal facilities are those disposal facilities available for use by all the residents within the geographical limits of a local governmental jurisdiction. A municipal facility may be publicly or privately owned and/or operated.

Contract facilities are privately owned and operated refuse disposal facilities available for use by a selected group or portion of the public, regardless of their geographical location. The use of these facilities is by agreement between the private owner and the user.

Private facilities are facilities under the control of a private individual, business, industry, or institution, and are available for use by that individual, business, industry, or institution only.

STATE REGULATIONS

An amendment to the Connecticut Public Health Code, effective June 7, 1966, which is concerned with refuse disposal, has started to have an impact on refuse disposal in Southeastern Connecticut. Under Section 19-13-B24a of the Connecticut Public

* The inventory information contained in this section is based in part upon on-site inspections of existing refuse disposal facilities in October and November, 1966.

Health Code any public refuse disposal area must meet the following requirements:*

1. All dumped refuse must be compacted and covered daily with at least 6 in. of cover material. Final covering must be at least 2 ft. deep.

2. There shall be no burning of refuse except by high temperature incinerator or by permit for demolition materials and brush.

3. No refuse shall be deposited within 50 ft. of the high-water mark of any watercourse or on land where surface runoff may carry refuse into an adjacent watercourse.

4. Refuse disposal areas shall be effectively maintained and operated with respect to supervision, fencing, signs, insect and vermin control, salvaging and access roads.

5. All proposed new refuse disposal areas must be approved as to site and method of disposal by the Commissioner of Health.

REGIONAL REFUSE COLLECTION AND DISPOSAL

Of the 17 towns in Southeastern Connecticut, three towns have municipal collection service covering all of the town, and four have collection service for parts of the town. Private scavengers provide service in 14 towns, 10 of them in total, and four of them in part. Only in Jewett City, the Mystic Fire District, and Stonington Borough are collection services provided by contract to the municipality. Thus, three towns offer municipal collection throughout the town, 10 towns depend totally upon private collections, and four towns have combinations of municipal, private, and contracted collections.

All municipalities within the Southeastern Connecticut region, with the exception of Franklin and Griswold town, outside of Jewett City, are served with municipal refuse disposal facilities located within the region. Both Franklin and Griswold town residents are served by the Canterbury municipal refuse disposal facility located in the Town of Canterbury outside the region.

There are four contract facilities in the region. Two are primarily piggeries, but have open dumps for the disposal of

* For the complete text of Section 19-13-B24a, see Appendix A.

non-garbage refuse. The third is operated primarily for salvage, and contains an open dump for nonsalvageable material. The fourth is an open dump for a group of industries.

There is a total of 19 municipal refuse disposal facilities in the 17 towns of Southeastern Connecticut. Two municipalities - Norwich and Jewett City - maintain two disposal facilities, while Franklin and Griswold (outside Jewett City) have none. New London has an incinerator and landfill disposal system. The remaining 13 towns have one municipal refuse disposal facility each. There are five sanitary landfills, six open dumps, and seven modified sanitary landfills (weekly covering of deposited refuse).

There are numerous private disposal facilities, but the exact number is not known. Since the principal concern is with the largest private facilities and those with special disposal problems, a survey of major regional industries and institutions was made. A total of 80 industries and institutions were contacted and 52 responded. Of the 52 responses, 21 rely solely on municipal facilities; 19 make use of municipal facilities in part as well as contract and private facilities, and the remaining 12 rely solely upon contract and private facilities. Thus, a total of 40 or 77 percent make use of municipal facilities in whole or in part.

MUNICIPAL REFUSE DISPOSAL FACILITIES

Table 1 lists the municipal refuse disposal facilities in the region. Each facility is described in terms of its type, ownership, service area, site characteristics, land use, zoning, and kinds of refuse handled. The approximate locations of each facility are shown on Figure 4. The discussion below is on the individual disposal facilities by municipality.

Bozrah. Figure 4 shows the location of the Bozrah town refuse disposal facility on Route 163 in the southwestern corner of the town. The area is predominantly undeveloped. Zoning is called "rural" and any land use is permitted. The facility is owned and operated by the town and is the only municipal facility serving the residences, businesses, and industries of Bozrah. Bozrah's estimated 1966 population was 2,000. Commercial and industrial establishments are few.

The site is approximately 3.5 acres of rough terrain. It is estimated that 135 acre-feet of space are available for future use. Most of this unused portion of the site is wooded.

This facility is operated as an open dump. The top of the dump is covered monthly, but the face is not. Cover material is hauled to the site over a distance of approximately three miles. Burning occurs through self-ignition. Access to the

Table 1. Inventory of Municipal Refuse Disposal Facilities

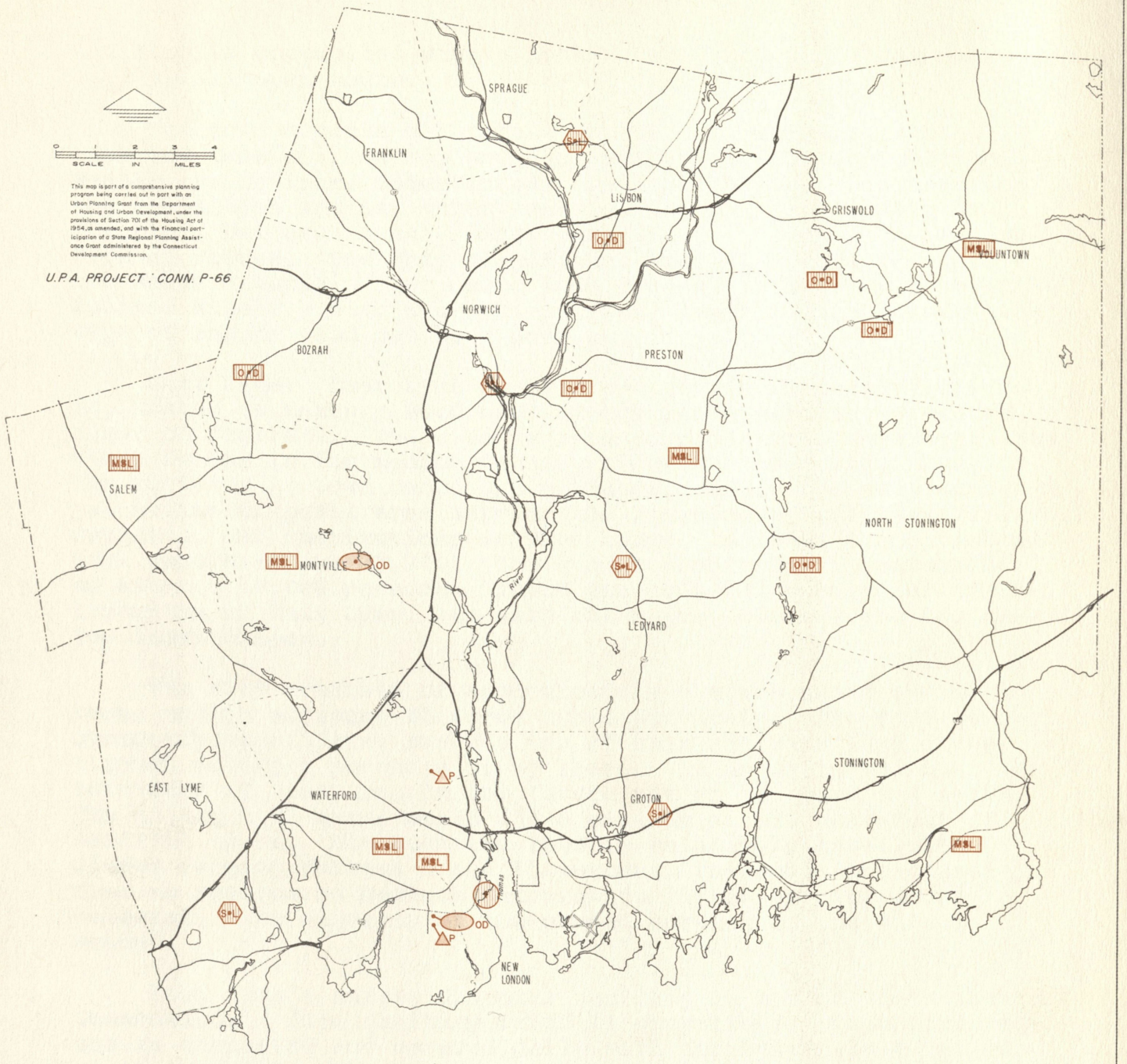
Municipality and name of municipal disposal facility	Type of facility[1]	Ownership	Served population 1966		Physical site		Characteristics		Types of refuse handled								
			Year-round	Seasonal	Land area (acres)	Remaining usable volume (acre-ft.) *	Slopes percent	Soils	Garbage and rubbish	Ashes	Street refuse	Construction & demolition wastes	Dead animals	Junk vehicles	Sewage solids	Bulky wastes
Bozrah																
Town refuse disposal facility	Open dump	Town	2,000	Same	3.5	185[3]	0-35	Shallow to bedrock	x	x	x	x		x (if cut up)		x
East Lyme																
Town refuse disposal facility	Sanitary landfill	Town	8,700	18,600	4.0[2]	24[2]	0-15	Shallow to bedrock	x	x	x	x			x	x
Jewett City																
Burdick refuse disposal facility	Open dump	Private	4,200	Same	75	1,184	0-15	Sand and gravel	x	x						
Old Borough refuse disposal facility	Open dump	Borough	4,200	Same	10	44	0-10	Sand and gravel; organic soils					x			x
Groton																
Town sanitary landfill	Sanitary landfill	Town	35,400	37,400	168	2,500	0-15	Shallow to bedrock; organic soils	x	x	x	x	x	x	x	x
Ledyard																
Town refuse disposal facility	Sanitary landfill	Private	10,000	Same	60	590	0-15	Shallow to bedrock	x	x	x	x		x (if cut up)		x
Lisbon																
Town refuse disposal facility	Open dump	Town	2,400	Same	2	10	0-10	Sand and gravel; organic soils	x	x	x	x				x
Montville																
Town refuse disposal facility	Modified sanitary landfill	Private	13,000	Same	20	32	0-15	Stony to extremely stony; organic soils	x	x	x					x
New London																
City incinerator	Incinerator	City	34,000	Same	-	NA	NA	NA	x		x		x			
Bates Woods landfill	Modified sanitary landfill	City	34,000	Same	30	800	0-5	Shallow to bedrock; organic soils		x		x				x
North Stonington																
Town refuse disposal facility	Open dump	Town	3,200	3,800	11	120	0-35	Shallow to bedrock	x	x	x	x				x
Norwich																
Hollyhock Island	Sanitary landfill	Town	41,200	Same	15	120	0-5	Mostly fill	x	x	x		x			
Corning Road	Open dump	Town	41,200	Same	70	1,750	0-15	Shallow to bedrock; stony to extremely stony; organic soils				x				x
Preston																
Town refuse disposal facility	Modified sanitary landfill	Town	2,700	Same	5.5	60	0-15	Stony to extremely stony	x	x	x					x
Salem																
Town refuse disposal facility	Modified sanitary landfill	Town	1,300	2,300	5.7	40	15-35	Shallow to bedrock	x	x	x					x
Sprague																
Town refuse disposal facility	Sanitary landfill	Town	2,700	Same	10	370	0-35	Sand and gravel	x	x	x	x				x
Stonington																
Town refuse disposal facility	Modified sanitary landfill	Town	15,300	15,800	6.4	88	0-15	Shallow to bedrock; some stony to extremely stony	x	x	x	x				x
Voluntown																
Town refuse disposal facility	Modified sanitary landfill	Private	1,300	1,800	150	1,000	0-15	Sand and gravel	x	x	x	x	x			x
Waterford																
Town refuse disposal facility	Modified sanitary landfill	Private	17,300	17,500	20	-[3]	0-15	Sand and gravel; stony to extremely stony	x	x	x	x	x			x

1. Facilities have been classified as follows: Sanitary Landfill, Modified Sanitary Landfill, Open Dump, and Incinerator.
2. Town has option to buy 42 acres of land adjacent to present site. It is estimated that a minimum of 800 acre-ft. of additional landfill volume will become available with this purchase.
3. The town estimates that very little space remains.

* One acre-foot equals one land acre with an average depth of one foot throughout. Generally, land requirements for sanitary landfill range between 1.0 and 1.5 acre-foot per 1,000 population per year including cover.

Source: Questionnaire and field survey by Metcalf & Eddy, October and November 1966. Data of State Department of Health, December 1967

SOUTHEASTERN CONNECTICUT REGION



MUNICIPAL REFUSE DISPOSAL FACILITIES

- Incinerator
- S•L — Sanitary Landfill
- MSL — Modified Sanitary Landfill
- O•D — Open Dump

CONTRACT REFUSE DISPOSAL FACILITIES

- P — Piggery
- OD — Open Dump

NOTE:
Information based on field survey by Metcalf & Eddy - October, November 1966, and data supplied by the State Health Department - December, 1967

EXISTING REFUSE DISPOSAL FACILITIES

FIGURE 4

PREPARED BY METCALF & EDDY ENGINEERS • PLANNERS
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NOVEMBER, 1967

facility is controlled with a locked gate, and a custodian is on duty at all open hours.

The town accepts all refuse except dead animals, septic tank and cesspool wastes, and junk automobiles.* Most of the wastes are ordinary domestic garbage and rubbish. Construction and demolition wastes, street refuse, and bulky materials are accepted, but are in very minor quantities. There is no separation of refuse. The only significant special refuse is a plastic waste material which comes from a local industry and which ignites itself. With a proper sanitary landfill operation, this type of refuse need not be a problem.

East Lyme. East Lyme's municipal refuse disposal facility is located on Roxbury Road east of the State Farm for Women as shown on Figure 4. The site is in a predominantly developed area where zoning is for medium density suburban residential uses.** The facility is town owned and operated, and is the only municipal refuse disposal area serving the residences, businesses, industries, and institutions in East Lyme. In 1966, the estimated town population was 8,700. The summer population is estimated to average 18,000 persons. There are over 200 commercial establishments in East Lyme, but only one major industry and two major institutions.

The site consists of approximately 4 acres owned by the town, and an adjacent 42 acres owned privately. The town is presently negotiating for the use of this adjacent land either through outright purchase or by lease. It is estimated that 24 acre-feet of space remain for future use on the town's 4 acres. The adjacent 42 acres would add a minimum of 800 acre-feet of landfill space. Although the land is relatively level with slopes ranging between 0 and 15 percent, the soils are classified as shallow to bedrock and provide little on-site cover material. The majority of the unused portion of the site is wooded.

East Lyme's refuse disposal facility is one of Southeastern Connecticut's five sanitary landfill operations. Deposited refuse is compacted and covered daily with approximately 6 in. of cover material. The source of this material is the town sand bank located three miles from the disposal site. There is a custodian on duty at all open hours. However, access to the dump is not controlled and, therefore, it is possible to use the dump facilities 24 hours a day. Only brush, construction and demolition wastes are burned.

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* Junk automobiles are accepted if cut up.

** Medium density suburban residential uses indicate per family land area requirements between 20,000 sq. ft. and 40,000 sq. ft.

All types of refuse, except junk automobiles and dead animals, are accepted at the town refuse disposal facility. There is separation, however. Sewage solids are deposited in a special area; construction and demolition wastes are burned at another special area; bulky materials are dumped in a separate location; and ordinary garbage and rubbish are deposited and buried. There are no hazardous or special wastes.

Griswold-Jewett City. There are two refuse disposal facilities in Griswold, both of which are located outside the Borough of Jewett City but serve only the population within the Borough. The general refuse disposal facility, called the Burdick disposal facility, is located off Rixtown Road just south of Young Road (see Figure 4). This is a rural, predominantly undeveloped portion of Griswold. There is presently no zoning.

The Burdick facility is privately owned and operated through a contractual agreement between the Borough and the private owner. This site serves as the general refuse disposal facility for Jewett City, with an estimated 1966 population of 4,200 and an estimated 45 commercial establishments. The major and significant Jewett City industries do not use this facility.

The Burdick refuse disposal site is approximately 75 acres of land, located on suitable soil and slope conditions (slope 0 to 15 percent, soils classified as well drained to excessively drained soils of the terraces over sand and gravel). The majority of the unused portion of the site is woodland, requiring extensive clearing before use. It is estimated that the remaining usable space is 1,184 acre-feet.

The Burdick dump is operated as an open dump with only periodic, weekly to monthly, covering. Cover material is obtained on the site. There is no burning. Access to the facility is controlled with a locked gate. Individual use of the facility is not permitted, the only permitted dumping being by the private owner who is the only collector of refuse serving Jewett City.

Ordinary garbage and rubbish is the only type of refuse accepted at the Burdick facility.

The second refuse disposal facility in Griswold, and serving the Borough of Jewett City only, is the Old Borough Dump. This facility is located off the east side of Colonel Brown Road just south of Bethel Road. As was the case with the Burdick facility, the Old Borough Dump is located in a predominantly undeveloped rural area. There is no zoning. This facility is owned and operated by the Borough of Jewett City and serves the residences and businesses within the limits of Jewett City.

The site is approximately 10 acres in size. The terrain is relatively level with slopes between 0 and 10 percent. Soils are predominantly sand and gravel, but the site's eastern boundary

abuts a stream and an associated area of wet and poorly drained soils. The unused portion of the facility is predominantly wetland. According to town officials, the remaining dump capacity is 44 acre-feet.

The Old Borough Dump is operated as an open dump with no covering.

Bulky wastes and dead animals are the only solid wastes disposed of at this facility. The two types of refuse are separated. Public access to the site is not permitted and is controlled by a locked gate at the entrance road. Only the Jewett City borough collection truck is permitted to use the dump. There is no burning at the facility.

Groton. The Groton refuse disposal facility is located adjacent to Route I-95 off Flanders Road. Although the land use in the immediate area of the facility is predominantly undeveloped, it is located in an area zoned for medium density suburban residential use.

This refuse disposal facility is owned and operated by the Town of Groton. It is the only disposal facility serving all the villages and boroughs within the Town of Groton, as well as all those who live outside of these separate districts. Thus, the facility serves the total town population estimated to be 35,400 in 1966, approximately 220 commercial establishments, and several major industries and institutions.

The present used site size is approximately 80 acres. An additional 88 acres adjacent to the site has been purchased for future use. Slopes over the area are predominantly 0 to 15 percent. Soils are classified as shallow to bedrock and poorly drained.

Land presently used is predominantly cleared. The portion recently purchased is predominantly woodland. The future usable space of the original 80-acre tract is estimated to be 500 acre-feet. An estimated 2,000 acre-feet of landfill space is available on the adjacent 88-acre tract.

The Groton town refuse disposal facility has been operated as a sanitary landfill since 1964. The deposited refuse is compacted and covered daily with between 6 in. and 1 ft. of cover. The source of the cover material is a reservoir gravel pit 1.5 miles away. Access to the facility is controlled by a locked gate. A custodian is on duty at all open hours. The only burning is in a special area where classified plans of the Electric Boat Division of General Dynamics Corporation are destroyed.

All types of refuse are accepted at the Groton sanitary landfill. Only dead animals and septic tank and cesspool wastes are disposed of in separate areas at the landfill. All other

refuse is combined and dumped at the same location, compacted, and covered. Bulky materials, such as abandoned automobiles, refrigerators, etc., are crushed and put into the same landfill operation.

Ledyard. As shown on Figure 4, the Ledyard town refuse disposal area is located on the west side of Route 117 north of the intersection with Churchill Road. The site is in a predominantly rural area which is zoned for residential medium density suburban use.

The Ledyard refuse disposal facility is privately owned and operated on contractual terms between the town and the private owner. It is available for use by all town residents and businesses. The estimated 1966 population was 10,000 persons.

The site size is approximately 60 acres. Slopes range between 0 and 15 percent. Soils are shallow to bedrock, and stony to extremely stony. Less than an acre of this site is presently in use. The remaining area is predominantly woodland. The estimated remaining usable space is 590 acre-feet, assuming the woodland is cleared.

The facility has been classified as a sanitary landfill. Cover material is obtained from a gravel bank approximately one mile away. Access to the site is controlled by a gate and lock. At the open hours, however, the custodian is not always on duty.

All types of refuse except sewage solids and hazardous wastes* are accepted at the town refuse disposal facility. This includes ordinary garbage and rubbish, construction and demolition wastes, and bulky materials. Only large bulky materials are separated at the disposal site.

Lisbon. As shown on Figure 4, the Lisbon town refuse disposal facility is located on the west side of Route 169 at Allen Road. The land use in the area is predominantly undeveloped rural land. There is no zoning in the town.

The facility is owned and operated by the Town of Lisbon and is available to the entire town population, estimated to be 2,400 in 1966, as well as to the few town businesses, industries, and institutions.

The site size is 2 acres. The soils are mostly sand and gravel surrounded by a swampy area of poorly drained soils. An estimated 10 acre-ft. of usable space remains.

The facility is presently operated as an open dump. Approx-

* Although not excluded, there are no hazardous wastes deposited at the facility.

refuse is combined and dumped at the same location, compacted, and covered. Bulky materials, such as abandoned automobiles, refrigerators, etc., are crushed and put into the same landfill operation.

Ledyard. As shown on Figure 4, the Ledyard town refuse disposal area is located on the west side of Route 117 north of the intersection with Churchill Road. The site is in a predominantly rural area which is zoned for residential medium density suburban use.

The Ledyard refuse disposal facility is privately owned and operated on contractual terms between the town and the private owner. It is available for use by all town residents and businesses. The estimated 1966 population was 10,000 persons.

The site size is approximately 60 acres. Slopes range between 0 and 15 percent. Soils are shallow to bedrock, and stony to extremely stony. Less than an acre of this site is presently in use. The remaining area is predominantly woodland. The estimated remaining usable space is 590 acre-feet, assuming the woodland is cleared.

The facility has been classified as a sanitary landfill. Cover material is obtained from a gravel bank approximately one mile away. Access to the site is controlled by a gate and lock. At the open hours, however, the custodian is not always on duty.

All types of refuse except sewage solids and hazardous wastes* are accepted at the town refuse disposal facility. This includes ordinary garbage and rubbish, construction and demolition wastes, and bulky materials. Only large bulky materials are separated at the disposal site.

Lisbon. As shown on Figure 4, the Lisbon town refuse disposal facility is located on the west side of Route 169 at Allen Road. The land use in the area is predominantly undeveloped rural land. There is no zoning in the town.

The facility is owned and operated by the Town of Lisbon and is available to the entire town population, estimated to be 2,400 in 1966, as well as to the few town businesses, industries, and institutions.

The site size is 2 acres. The soils are mostly sand and gravel surrounded by a swampy area of poorly drained soils. An estimated 10 acre-ft. of usable space remains.

The facility is presently operated as an open dump. Approx-

* Although not excluded, there are no hazardous wastes deposited at the facility.

imately once per month the deposited refuse is compacted and covered with material from a source approximately two miles away. The depth of the cover is 3 to 6 in. There is a gate and lock to control accessibility to the dump. A custodian is scheduled to be on duty at all open hours of the dump. There is some burning of separated burnable refuse.

All garbage, rubbish, construction and demolition wastes, street refuse, and bulky materials are accepted at the disposal facility. Abandoned automobiles and dead animals are not accepted. There are no sewage solids deposited at the facility, but there are no regulations against it. There is no real separation of refuse at the disposal site.

Montville. Montville's refuse disposal facility is located on the north side of Black Ash Swamp Road near Chapel Hill. The area is mostly undeveloped and rural in nature. There is no zoning in Montville.

The Montville refuse disposal facility is privately owned and operated through a contractual agreement between the town and the private owner. It is available for use by the entire town population (13,000 estimated for 1966), as well as all town commercial, industrial, and institutional establishments.

This site is approximately 20 acres in area. The terrain is relatively flat with slopes between 0 and 15 percent on soils predominantly stony to extremely stony. Most of the unused portion of the site is woodland with some poorly drained swampy soils. An estimated 32 acre-feet of space remain for future use.

The Montville town refuse disposal facility is operated as a modified sanitary landfill. The trench method is used with covering occurring daily following compaction. Access to the site is controlled by a gate and lock. A custodian is on duty at all open hours of the dump. Some burning of brush occurs occasionally.

Refuse disposed of at the town refuse disposal facility includes garbage, rubbish, street refuse, and bulky materials. The bulky wastes are separated from the ordinary garbage and rubbish. Other types of refuse are not accepted at the facility.

New London. The only municipal incinerator in the Southeastern Connecticut Region is located in New London and serves as the principal refuse disposal facility for that city. In addition, the city maintains a modified sanitary landfill for the disposal of bulky materials and incinerator residue.

New London's incinerator is located on Trumbull Street adjacent to the city's sewage treatment plant. Its location is in a highly urbanized portion of New London with existing land uses predominantly a mixture of commercial and high density residen-

tial uses. The area is zoned for industry.

The facility is owned and operated by the City of New London. It serves the entire city's estimated 1966 population of 34,000 persons. The incinerator is also available for use by all city businesses, industries, and institutions.

Built in 1940, the incinerator has a 120-ton per 24-hour day rated capacity. The present burning rate ranges between 40 and 50 tons per day. Operating temperatures are between 2,000 and 2,400 deg. F. The facility consists of a dumping pit from which the refuse is taken by overhead cranes and deposited in any one of the four furnaces. The feeding hoppers are limited by 4 ft. square openings.

All city rubbish, garbage, street refuse, and dead animals are disposed of at the town incinerator. Septic tank pumpings from city residents are taken to the city's sewage treatment plant for disposal.

The city's modified sanitary landfill is located in the Bates Woods Park near the Waterford town line. This area is undeveloped park land and is zoned for urban density (less than 5,000 sq. ft. per family) residential uses. The facility is owned and operated by the City of New London. It is available for use by all city residents, businesses, industries, and institutions.

The disposal site is an estimated 30 acres in area, is relatively flat, and has shallow to bedrock soils surrounded by poorly drained swampy soils. The used portion is about 4 acres. It is estimated that approximately 800 acre-feet of space remain for future use.

The facility is operated as a modified sanitary landfill, with the cover material being hauled to the site over a distance of approximately six miles. Access to the site is controlled by a gate and lock, and a custodian is on duty at all open hours. Construction and demolition wastes are the only type burned at the site.

All ashes, construction and demolition wastes, and bulky materials are accepted at this site. Separation, although attempted, is not carried out successfully.

North Stonington. North Stonington's refuse disposal facility, located off Wintechog Hill Road, is in a predominantly rural area, which is presently zoned for medium density suburban residential use. The facility is owned and operated by the town and serves the entire community. North Stonington's 1966 population was estimated to be 3,200 persons. The facility is also available to the town's few commercial and industrial establishments.

This site is 11 acres in size and is in an area of rough terrain with slopes between 0 and 35 percent. Soils are classified as shallow to bedrock. The used dumping area is approximately one acre. The remaining usable space is estimated to be 120 acre-feet and is mostly woodland.

The facility is presently operated as an open dump with the top of the dump being covered approximately every six weeks. Cover material is hauled to the site over a distance of two miles. Access to the facility is controlled by a chain and lock, and a custodian is on duty, as needed. In winter months, when there is snow on the ground, burning of all refuse occurs.

All garbage, rubbish, construction wastes, street refuse, and bulky materials are permitted at the town refuse disposal facility. Abandoned automobiles are not permitted. Sewage solids are not accepted in North Stonington. There are no dead animals or hazardous wastes disposed of in North Stonington. There is no separation of the refuse deposited at the town facility.

Norwich. Norwich maintains two refuse disposal facilities, one for ordinary garbage and rubbish, and the second for special bulky and burnable wastes.

The first facility is the Hollyhock Island sanitary landfill located on Hollyhock Island adjacent to the city sewage treatment plant. It is surrounded on three sides by water and shares the island with industrial land uses. The area is zoned for industry.

Owned and operated by the City of Norwich, the Hollyhock Island refuse disposal facility is available for use by the entire city, which had an estimated 1966 population of 41,200 persons. It is also available to all city businesses, industries, and institutions.

The site is approximately 15 acres in size and consists predominantly of filled land resulting from the disposal of refuse. This site is level, completely open, and bounded on three sides by water. The estimated remaining usable space is 120 acre-feet.

The facility is operated as a sanitary landfill. Covering is daily with material hauled to the site over a distance of approximately three miles. The facility is gated and locked, and a custodian is on duty at all open hours. There is no burning at this site.

All garbage, rubbish, street refuse, and dead animals are disposed of at the Hollyhock Island sanitary landfill. No separation of this refuse takes place at this site. However, there is a separation of refuse to determine which goes to the Hollyhock Island site and which goes to the Corning Road site.

The Corning Road refuse disposal site, located on the

Norwich-Preston town line at the end of Corning Road, is bounded on the west by a developed residential area in Norwich and abuts a rural area in the Town of Preston. The zoning in this area is medium density residential.*

The Corning Road facility is also city owned and operated. It serves the total city population of 41,200 persons as well as being available to all city businesses, industries, and institutions.

The site is approximately 70 acres in size and consists predominantly of shallow to bedrock soils, some well to moderately well-drained upland soils, and some poorly drained soils. Of the unused portion of the area (approximately 58 acres), part is open land and part is woodland. Approximately 1,750 acre-ft. are estimated to remain for future use.

The facility is operated as an open dump with burning. There is no compaction and there is no covering of disposed refuse. Access to the facility is controlled with a gate and lock. There is a custodian on duty during all open hours. Demolition and other burnable wastes are burned at this site.

This special facility accepts only construction and demolition wastes and bulky wastes. Separation occurs only to the extent of combining burnables where they may be disposed of in that manner.

Preston. Preston's town refuse disposal facility is located off Ross Road in a rural undeveloped section of town. Zoning restricts development in the area to medium density suburban residential land uses.

The facility is both owned and operated by the Town of Preston. It served a 1966 population estimated to be 2,700 persons (this excludes the Norwich State Hospital population of approximately 2,500 whose refuse is disposed of at the hospital's own facilities). The facility is available for use by all town commercial, industrial, and other institutional establishments.

The site is 5.5 acres in size, on slopes from 0 to 15 percent. Soils are the well to moderately well-drained upland soils. Most of the unused portion of the site (between 4 and 5 acres), is woodland. The site has an estimated 60 acre-ft. of space remaining for future use.

The facility is operated as a modified sanitary landfill, with covering occurring approximately monthly. Cover material is hauled to the site over a distance of approximately 4 or 5 miles.

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* Multi-family residences are also permitted in this zoning district.

Access to the facility is controlled by a gate and lock. The facility is open two days a week, 16 hours, and a custodian is on duty at all open hours. Burning of general refuse occurs.

All garbage, rubbish, street refuse, and bulky wastes are accepted at the town refuse disposal facility. There is no real attempt to separate types of deposited refuse.

Salem. The Salem town refuse disposal area is located on Rattlesnake Ledge Road in a rural, predominantly undeveloped, section of town. The area is zoned for medium density suburban residential land uses.

This facility is town owned and operated. It served an estimated 1966 town population of 1,300 and an additional 1,000 seasonal residents during the summer months. All town commercial, industrial, and institutional establishments may use the town facility.

The facility is located on a 5.7-acre site in an area of rough terrain with slopes from 15 to 35 percent. Soils are classified as shallow to bedrock. The unused area, approximately 5 acres, is mostly woodland. Future usable space is estimated to be 40 acre-ft.

The facility is operated as a modified sanitary landfill with covering occurring weekly. Cover material is hauled to the site over a distance of 3 miles. The facility is gated and locked and is under the supervision of a custodian during all open hours. Only brush is burned.

All town garbage, rubbish, and bulky materials are disposed of at the town facility. The garbage and rubbish are separated from the bulky wastes. Other types of refuse are not permitted.

Sprague. Sprague's town refuse disposal facility is located off Bushnell Hollow Road. The predominantly rural area is zoned for future industrial development. This town owned and operated facility served an estimated 1966 population of 2,700, as well as all town businesses, industries, and institutions.

The site is approximately 10 acres in size. Slopes range from 0 to 35 percent and soils are predominantly well to moderately well-drained upland soils and sand and gravel deposits. Most of the site is cleared land. Only two acres of the site are used. It is estimated that the remaining usable space is 370 acre-feet.

The disposal of ordinary refuse is by sanitary landfill. The ramp method is used, with the cover material being taken from the site itself. Covering occurs four or five times weekly. Access to the site is controlled by a gate and lock. During open hours, a custodian is on duty at all times. The only burning is

of special industrial wastes. These are contaminated sugar packets and waste Toluol, a highly flammable cleaning fluid.

The Sprague sanitary landfill accepts all garbage, rubbish, demolition and construction wastes, bulky material, and certain special and hazardous wastes. There is a separation of burnable hazardous wastes from the ordinary garbage and rubbish.

Stonington. Stonington's refuse disposal facility is located on Greenhaven Road just south of the New Haven Railroad tracks. The area is predominantly rural, but is zoned for medium density suburban residential uses. This is the only disposal facility in Stonington owned and operated by the town. It served an estimated town population of 15,300 persons in 1966 and is available for use by the town's commercial, industrial, and institutional establishments.

The site is 6.4 acres in size and is located on shallow to bedrock soils with slopes between 0 and 15 percent. Approximately 4.2 acres of the site are used. It is estimated that the remaining usable area is 88 acre-ft.

The facility is operated as a modified sanitary landfill with some burning of construction and demolition wastes, brush and stumps, and other burnable materials. Although covering of the top takes place daily, the face of the facility is left open. Cover material is hauled to the site over a distance of approximately 4 miles from a source in Westerly, Rhode Island. Access to the site is controlled with a gate and lock. A custodian is on duty at all open hours.

All types of refuse are handled at this site except junk automobiles, dead animals, or sewage solids. Although there is an attempt to separate refuse at the site, there has been little success to date.

Voluntown. The Voluntown refuse disposal facility, located off Route 138, is in a predominantly rural area. There is no zoning in Voluntown. The facility is privately owned and operated through a contractual agreement with the town. It served the town's 1966 estimated population of 1,300 persons, and is available for use by the few town commercial, industrial, and institutional establishments.

The site is 150 acres in size of which only about 5 acres are used. A minimum of 1,000 acre-ft. remain for future use. The slopes are 0 to 15 percent, and the soils are predominantly sand and gravel. The unused portion of the site is mostly woodland.

The facility is classified as a modified sanitary landfill with covering semiweekly. The cover material is taken from the site. Access to the site is controlled by a gate and lock. The

facility is open daily, except Sundays, for eight hours. There is no custodian on duty during the open hours.

The facility accepts all garbage, rubbish, construction and demolition wastes, and bulky materials. A special trench is used to bury dead animals. Separation is limited to the removal of burnable materials from deposited refuse for purposes of burning.

Waterford. The Waterford refuse disposal facility, located to the southeast of the New London airport, is in an undeveloped portion of the town. Two zoning districts cover the area, one is industrial and the second permits medium density suburban residential uses. The facility is privately owned, but operated by the town. It serves the entire town with an estimated 1966 population of 17,300. It is also available for use by all town commercial businesses, industries, and institutions.

The site is approximately 20 acres in size and is located on fairly level terrain, with slopes generally between 0 and 15 percent. Soil types are predominantly gravel and well to moderately drained upland soils. Some large boulders were observed at the site during the on-site inspection. Practically all of the area is used.

This facility is classified as a modified sanitary landfill even though there is daily compaction and covering, because there is burning of combustible materials. Cover material is obtained from adjacent land from which the haul distance is approximately one-quarter mile. Access to the facility is uncontrolled. A custodian is on duty 40 hours a week, 48 hours per week during summer months.

All types of refuse except junk cars are accepted at the town disposal facility. Special areas of the facility have been set aside for sewage solids,* and for bulky materials. Combustible materials are also separated.

CONTRACT FACILITIES

There are four contract refuse disposal facilities in Southeastern Connecticut. Three are located in Waterford and the fourth is located in Montville. Their locations are indicated on Figure 4.

Table 2 lists the four contract refuse disposal facilities

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* Since the field survey, a new site for the disposal of septic tank pumpings has been established by the Southeastern Connecticut Pumpers Association off Miner Lane.

Table 2. Contract Refuse Disposal Facilities, 1967

Name and location of facility	Type of Facility	Service area	Type of refuse handled
A. Secchiaroli and Sons			
Waterford	Piggery and open dump	Commercial and institutional properties in New London, Groton, and Waterford	Garbage and rubbish only
Millaras Piggery			
Waterford	Piggery	Commercial (restaurants) and institutional properties in Groton, New London, Waterford, and Preston	Garbage
Galbo Refuse Disposal			
Waterford	Open dump	Commercial properties in Groton, New London, and Waterford	Primarily salvageable refuse and ordinary rubbish
Fox Refuse Disposal			
Montville	Open dump	Industries in Montville and Norwich	Ordinary rubbish

Source: Survey by Metcalf & Eddy, January, 1967.

Table 2. Contract Refuse Disposal Facilities, 1967

Name and location of facility	Type of facility	Service area	Type of refuse used
A. Specialized and Inactive			
Waverford	Refinery and open dump	Commercial and industrial properties in Mer Lenior, Groton, and Waterford only	Garbage and rubbish
Municipal Plants			
Valentown	Incinerator	Commercial (predominately) and industrial properties in Groton, Mer Lenior, Waterford, and Preston	Garbage
Ownership Unspecified			
Waterford	Open dump	Commercial properties in Groton, Mer Lenior, and Waterford	Primarily refuse; garbage and rubbish
For Refuse Disposal			
Northville	Open dump	Residential properties in Northville and Montvil	Garbage; rubbish

Source: Survey by Public Works, 1967.

and significant characteristics about each. An expanded discussion follows:

Secchiaroli & Sons, Waterford. This facility is operated primarily as a piggery, but also includes an open dump for depositing incidental refuse collected with the garbage. It is located on Miner Lane in Waterford in a predominantly rural and undeveloped area. The site lies in two zoning districts, one industrial, and the other medium density residential.

This privately owned and operated facility collects and disposes of garbage and rubbish received primarily from commercial and institutional establishments in Groton, New London, and Waterford. No domestic or industrial refuse is deposited at this site.

Millaras Piggery. This refuse disposal facility is operated as a piggery and is located on Bloomingdale Road in Waterford. It is privately owned and operated. Garbage is collected from institutions and restaurants in the Towns of Groton, New London, Waterford, and Preston (the Norwich State Hospital).

The refuse disposal facility is located in a predominantly undeveloped area of Waterford. Present zoning permits medium density suburban residential uses.

Galbo Refuse Disposal Facility. This is an open dump and a salvaging operation. It is located in Waterford on Miner Lane next to the Secchiaroli piggery. The private owner and operator of this facility collects primarily salvageable materials from stores in Waterford, New London, and Groton. Small quantities of nonsalvageable material which accumulate are deposited in an open dump.

The area is predominantly rural and is zoned for medium density suburban residential uses.

Fox Refuse Disposal Facility. The fourth contract refuse disposal facility in Southeastern Connecticut is located in Montville at the intersection of Meeting House Lane and Oakdale Road. This is an open dump facility with burning. There is no covering of the refuse. This facility serves several industries in Montville and Norwich. No other types of refuse are collected. Approximately 90 percent of the collected refuse is received from Robertson Paper Box Company in Montville.

Land use in the area is open and predominantly undeveloped. There is no zoning in Montville.

REFUSE QUANTITIES

Table 3 lists the present quantities of refuse disposed of

at the various municipal facilities throughout the region. Estimates by volume or weight were available from only 10 communities.* Refuse quantities from the remaining seven municipalities were estimated on the basis of per capita quantities ranging from 2.0 lb. per capita per calendar day to 4.0 lb. per capita per calendar day, depending upon refuse types, land uses served, and the extent of private disposal.

The total 1966 quantity of refuse sent to disposal in Southeastern Connecticut was estimated to be 161,000 tons,** of which about 138,000 tons were in municipal facilities. Another 7,000 tons were disposed of at contract facilities. It is estimated that 14,000 tons were disposed of privately, and 2,000 tons were disposed of outside of the region.

For the entire Southeastern Connecticut region, the total refuse production is estimated to average about 4.3 lb. per capita per calendar day. About 3.7 lb. per capita per day are disposed of in municipal facilities. Per capita refuse quantities at municipal facilities range from a low of 2.0 lb. per calendar day in several towns, to a high of 6.4 lb. per capita per calendar day in Sprague. Three of the region's four contract disposal facilities are in Waterford, and, therefore, probably have a significant reducing effect upon that town's per capita quantity disposed of at the municipal facility, which is shown as 2.4 lb. per capita per calendar day.

Sprague's high per capita figure is due almost solely to the use of the facility by industry. According to the town's estimates, approximately 80 to 85 percent of the total refuse disposed of at the town facility is received from local industries.

Refuse quantities in excess of 5 lb. per capita per calendar day are presently being disposed of in Groton. This high per capita quantity is based on town field surveys and an estimated 1966 population of 35,400 persons. The high per capita refuse production for Groton appears reasonable. The Electric Boat Division of General Dynamics contributes more than 10 percent of the total annual quantity disposed at the Groton facility. Also, all bulky wastes are dumped into the same location with ordinary garbage and rubbish and, therefore, increase the annual volume of fill considerably. It is this annual volume of fill which local authorities measured in field surveys.

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* Only five municipalities have measured quantities based upon actual field surveys. Of the remaining five, only three estimates appeared reasonable. The remaining two were revised by Metcalf & Eddy.

** These quantities do not include the quantities of special refuse types discussed separately in subsequent paragraphs of this chapter. These special refuse types are fly ash, junk automobiles and septic tank pumpings.

Table 3. Refuse Quantities, 1966

Town and facility	Total annual quantity of refuse (tons per year)		Average daily per capita quantity of refuse (lb. per capita per calendar day)
Municipal facilities			
Bozrah: town facility	1,095	(1)	3.0
East Lyme: town facility	6,702		3.3
Griswold: Jewett City-Burdick facility	2,683	(1)	3.5
Groton: town facility	35,500	(2)	5.4
Ledyard: town facility	5,475	(1)	3.0
Lisbon: town facility	1,095	(1)	2.5
Montville: town facility	10,400	(1)	4.4
New London: incinerator	17,363		2.9
Bates Woods landfill	2,600	(1)	0.4
North Stonington: town facility	1,222	(1)	2.0
Norwich: Hollyhock Island	26,000		3.5
Corning Road	3,500	(1)	0.5
Preston: town facility	986	(1)	2.0
Salem: town facility	732		2.6
Sprague: town facility	3,146		6.4
Stonington: town facility	11,162		4.0
Voluntown: town facility	520	(1)	2.0
Waterford: town facility	7,500		2.4
SUBTOTAL	137,681		Average 3.7
Contract facilities	7,428	(1)	NA
Private facilities	14,010	(1)	NA
Outside region	1,874		NA
GRAND TOTAL	160,993		Average 4.3

(1) Estimated.
(2) Includes 8,500 tons per year from the U.S. Naval Submarine Base which recently started using the town facility.
NA = not applicable.

Sources: Local authority; estimates by Metcalf & Eddy.

Note: These quantities do not include the quantities of special refuse types discussed separately in subsequent paragraphs of this chapter. These special refuse types are fly ash, junk automobiles and septic tank pumpings.

REFUSE COLLECTION METHODS

Table 4 reports the various refuse collection practices by municipality for the Southeastern Connecticut Region. Only seven towns provide municipal collection service, either for general refuse or for particular refuse types; either with municipal labor and vehicles, or by contract. Municipal collection services covering the entire municipality are offered in only three of these municipalities - New London, East Lyme, and Waterford. The residents of the remaining 10 communities must either make arrangements with a private scavenger or transport their own refuse to the appropriate disposal facility.

Refuse collectors in the region collect primarily ordinary garbage and rubbish only. The Borough of Jewett City provides weekly collections for bulky wastes. Norwich and the City of Groton make semiannual collections for bulky wastes. Private collectors in Montville collect bulky materials with the ordinary refuse. In all other towns, the transportation of all bulky wastes for disposal must be provided for on an individual basis.

The Pawcatuck Fire District restricts the collected refuse to garbage and nonburnable rubbish. Residents must burn their own trash.

In most cases, the private collectors transport the collected refuse to the municipal facility for the town from which they have collected the refuse. Two exceptions are known to exist. All refuse collected in Franklin is taken to a disposal site in Canterbury. Refuse collected from Griswold town is taken to the same disposal site in Canterbury.*

COSTS OF REFUSE COLLECTION AND DISPOSAL

Table 5 lists the most recent operating cost data** for the various towns and collection districts in Southeastern Connecticut. There are wide variations in unit costs for collection, and even more significantly for disposal. This indicates, and rightly so, the wide variety of factors which affect operating costs for refuse collection and disposal.

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* The Town of Griswold pays the Town of Canterbury a user fee for this privilege. Canterbury is outside the Southeastern Connecticut region.

** Operating costs are those of a recurring nature which are necessary to operate and maintain refuse facilities. These include wages, rental fees, equipment operation and maintenance, and similar materials. Excluded are capital expenditures of a nonrecurring nature such as costs for equipment purchases, land acquisition, etc.

Table 4. Inventory of Refuse Collection Practices by Municipality, 1966

Municipality	Collector[1]	Service area	Frequency-land use	Type of collected refuse	Type of collection vehicles	Deposition point
Bozrah	Private[2]	Total town	Weekly-residential; as needed-commercial	Garbage and rubbish	Packer and open dump	Town refuse disposal facility
East Lyme	Municipal	Total town	Weekly (twice weekly in summer) residential; as needed-commercial	Garbage and rubbish	Covered compactor	Town refuse disposal facility
Franklin	Private	Total town	Weekly	Garbage and rubbish	Covered truck	Outside of region
Griswold	Municipal	Jewett City	Weekly-residential, commercial	Bulky refuse only	Open dump truck	Old Borough dump
	Contractor	Jewett City	Weekly-residential, commercial	Garbage and rubbish	Packer and covered truck	Burdick refuse disposal facility
	Private	Other than Jewett City	weekly-residential, commercial	Garbage, rubbish and bulk	Packer and covered truck	Outside of region (Canterbury)
Groton	Municipal	City of Groton	Twice weekly-residential, commercial	Garbage and rubbish	Packers	Town refuse disposal facility
	Municipal	City of Groton	Twice yearly	Bulky material	Open dumps	Town refuse disposal facility
	Contractors	Mystic Fire District[3]	Twice weekly-residential, commercial	Garbage and rubbish	Packers and dump trucks	Town refuse disposal facility
	Private	Rest of town	Weekly-residential	Garbage and rubbish	Packers and dump trucks	Town refuse disposal facility; semipublic facilities
Ledyard	Private	Total town	Twice weekly-residential and commercial	Garbage and rubbish	Packers	Town refuse disposal facility
Lisbon	Private	Total town	Weekly-residential and commercial	Garbage and rubbish	Packers and open dump	Town refuse disposal facility
Montville	Private	Total town	Weekly-residential and commercial; as needed industrial	Garbage, rubbish and bulk	Packers and open dump	Town refuse disposal facility; semipublic facility
New London	Municipal	Total city	Twice per week-residential as needed-commercial	Garbage and rubbish	Packers	Incinerator
	Private	Individual, institutions, and commercial properties	As needed	Garbage and salvageable refuse	Packers and open truck	Incinerator and semipublic facilities
North Stonington	Private	Total town	Weekly	Garbage and rubbish	Covered truck and open trucks	Town refuse disposal facility
Norwich	Municipal	City consolidated district	Weekly-residential area twice weekly-downtown commercial	Garbage and rubbish	Compactors	Hollyhock Island
	Private	Town consolidated district	Weekly	Garbage and rubbish, all types	Compactors and open trucks with canvas covers	Hollyhock Island and Corning Road
Preston	Private	Total town	Weekly-residential, as needed-business	Garbage and rubbish	Packer and open dump	Town refuse disposal facility
Salem	Private	Total town	Twice weekly-residential, as needed-commercial	Garbage and rubbish	Covered dump trucks	Town refuse disposal facility
Sprague	Private	Total town	Weekly-residential, commercial	Garbage and rubbish	Packers and open dump	Town refuse disposal facility
Stonington	Municipal	Pawcatuck Fire District	Twice weekly-no commercial	Garbage and nonburnable rubbish	Compactors	Town refuse disposal facility
	Contractor	Stonington Fire District	Twice weekly-residential and commercial	Garbage and rubbish	Compactors	Town refuse disposal facility
	Contractor	Mystic Fire District(3)	Twice weekly-residential and commercial	Garbage and rubbish	Compactors	Town refuse disposal facility
	Private	Rest of town	Weekly	Garbage and rubbish	-	Town refuse disposal facility
Voluntown	Private	Total town	Weekly-residential and commercial	Garbage and rubbish	Open truck	Town refuse disposal facility
Waterford	Municipal	Total town	Weekly (twice weekly during summer) - residential and commercial	Garbage and rubbish	Packers	Town refuse disposal facility
	Private	Individual commercial properties and institutions	As needed	Garbage and salvageable rubbish	Packers and open trucks	Town refuse disposal facility, and semipublic facility

1. Individuals may bring refuse to municipal facilities in all instances during open hours.
2. Private collectors take refuse either to municipal facility or to contractor facilities.
3. The Mystic Fire District is in both Stonington and Groton, and therefore, is listed under both towns.

Source: Questionnaire and field survey by Metcalf & Eddy, October and November 1966.

Table 5. Operating Costs for Refuse Collection and Disposal

	Budget year	Total expenditures	Disposal cost per ton	Disposal cost per capita
Municipalities with municipal disposal costs only				
Bozrah	1965-66	$ 949	$0.87	$0.47
Griswold (town)	1965-66	1,000	0.86	0.33
Groton (town)	1965-66	43,813	1.23	1.22
Ledyard	1965-66	3,000	0.55	0.33
Lisbon	1965-66	595	0.54	0.25
Montville	1965-66	12,000	1.15	0.92
North Stonington	1965-66	1,963	1.60	0.67
Preston	1965-66	1,186	1.20	0.44
Salem	1965-66	2,297	3.14	1.58
Sprague	1965-66	1,849	0.59	0.71
Stonington (town)	1965-66	14,500	1.30	0.96
Voluntown	1965-66	1,838	2.80	1.39
Averages		7,083	1.32	0.77
Districts with refuse collection costs only				
Groton (city)	1965-66	55,005	5.02(1)	5.50(1)
Mystic	1965-66	34,000	8.10	5.92
Pawcatuck	1964-65	15,750	3.27	2.39
Stonington (borough)	1965-66	9,620	5.25	3.85

Districts with refuse collection and disposal costs

Town or district	Budget year	Total expenditures	Per capita expenditure			Per ton expenditure		
			Collection	Disposal	Combined	Collection	Disposal	Combined
East Lyme	1965-66	$44,047	NA	NA	$3.94	NA	NA	$6.57
Jewett City	1964-65	9,445	NA	NA	2.36	NA	NA	3.52
New London	1965-66	252,300	3.77	3.81	7.58	7.24	6.35	13.59
Norwich	1965-66	145,079	2.78	0.78(1)	3.56	3.85	1.07	4.92
Waterford	1964-65	42,400	2.08(1)	0.44(1)	2.52	8.00(1)	1.68(1)	9.68

1. Estimated.

Sources: State Tax Department, Municipal Division.

In the 1965-66 budget year,* a total of $692,636 was spent by towns and local tax districts on refuse collection and disposal in Southeastern Connecticut. This resulted in a per capita and a per ton expenditure of $3.41 and $4.30, respectively.

The range of disposal operation expenditures for the 15 municipalities was from $0.54 per ton in Lisbon to $6.35 per ton in New London. Per capita costs ranged from $0.25 in Lisbon to $3.81 in New London.

The average per ton and per capita costs for the 12 municipalities supporting refuse disposal only was $1.32 and $0.77, respectively. When the disposal costs for the three municipalities providing both collection and disposal services are combined with the 12 towns with disposal costs only, the average per ton and per capita costs for disposal are $1.66 and $0.95, respectively.

Factors which have significantly affected operating costs for refuse disposal are the following:

1. Type of Disposal Facility. Sanitary landfills generally cost more to operate than open dumps. However, this does not mean that they must be expensive. Sprague's sanitary landfill cost the town only 59 cents per ton and 71 cents per capita to operate in 1965-66.

2. Source of Cover Material. The source of the cover material is a more significant factor than the frequency of its use. The cover material for Sprague's sanitary landfill is on the disposal site, thus the reason for the low unit costs. Groton, Salem, and Montville must haul cover material to the disposal site.

3. Facility Operation and Control. Such things as the number of open hours per week, duty hours of a custodian, the degree of maintaining safe and healthful conditions, and control during nonopen hours, all affect operating costs. The Voluntown facility is open 48 hours per week. This is relatively high, especially considering the town's 1966 population of 1,300.

4. Types of Refuse Accepted. In Groton, most types of refuse are accepted. Even though there are separate areas for sewage solids and dead animals, this must be controlled. Bulky wastes such as old refrigerators and abandoned cars must be crushed. The handling of

* Expenditures by Jewett City and Pawcatuck are given for 1964-65 budget years.

all these different refuse types increases the unit costs.

As is evident from the above, optimum operating methods produce higher costs, and less efficient methods are less costly. Costs must be considered in conjunction with the evaluation of the adequacy of operation. This is done in a later chapter of this report.

Figure 5 shows, graphically, the comparative unit costs of refuse collection for those districts supporting municipal collection service. the Mystic Fire District and Waterford have the highest per ton costs for collection ($8.10 and $8.00 respectively), while the Pawcatuck Fire District has the lowest per ton cost, estimated to be $3.27. The average per ton cost for the seven districts is $5.81. Norwich, Stonington Borough, Groton City and Pawcatuck are below this average.

Per capita collection costs range from a high of $5.92 per capita in the Mystic Fire District to a low of $2.08 per capita in Waterford. In contrast, however, per capita collection costs for the region as a whole average $3.75. Only Norwich, Pawcatuck, and Waterford are below this average.

SPECIAL PROBLEMS

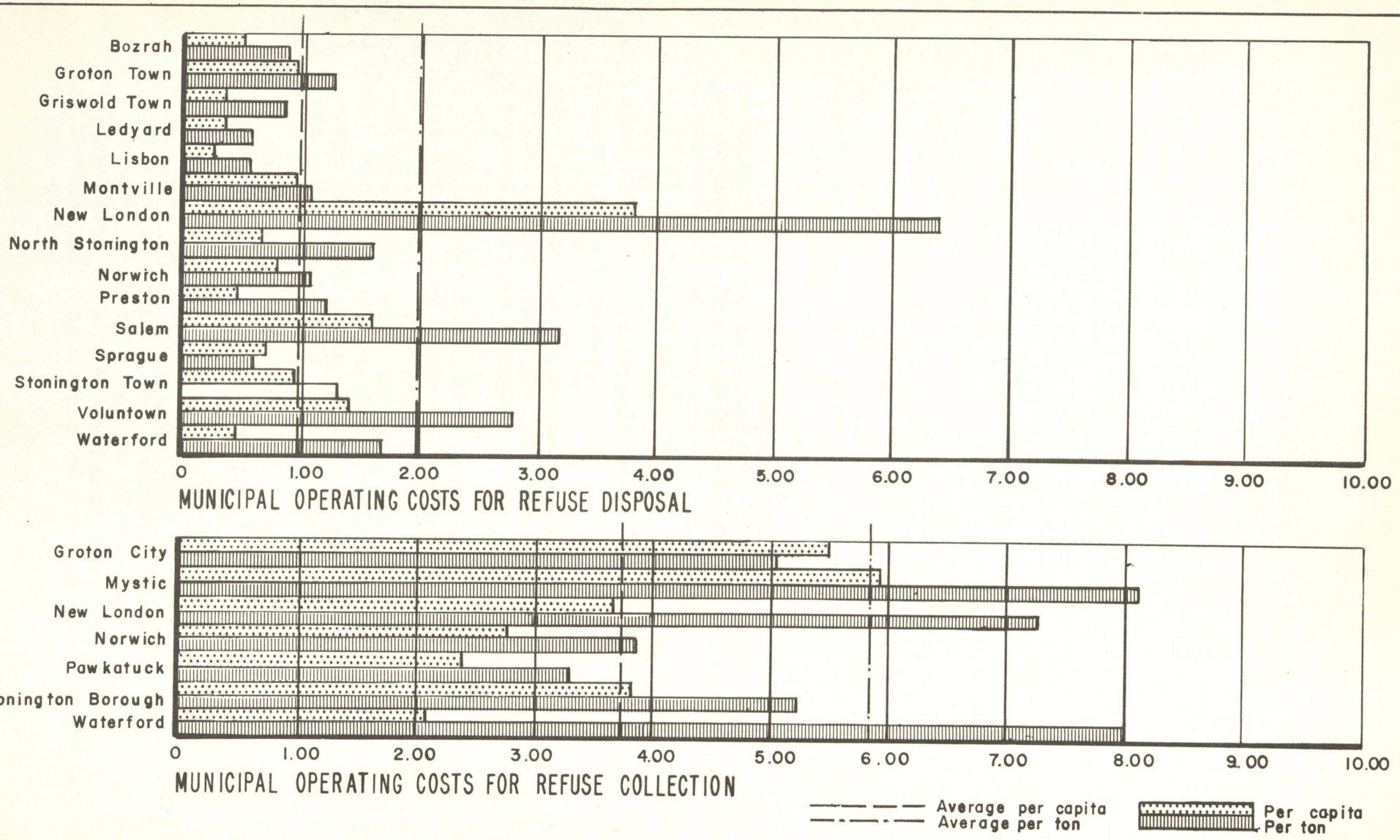
Special problems of refuse disposal are those whose solution must be found outside the ordinary daily operation of disposal. For purposes of this report, special problems have been classified as follows:

1. Industrial and institutional - nonhazardous.
2. Industrial and institutional - hazardous.
3. Junk vehicles.
4. Sewage solids.
5. Others.

Institutional and Industrial - Nonhazardous. This type of refuse is a special problem because of the quantities involved.

It is estimated that 18.5 percent* of the total quantity of refuse produced in Southeastern Connecticut comes from an industrial or institutional source. At the present time, approximately

* This does not include fly ash, junk automobiles or septic tank pumpings.



This chart is part of a comprehensive planning program being carried out in part with an Urban Planning Grant from the Department of Housing and Urban Development, under the provisions of Section 701 of the Housing Act of 1954, as amended, and with the financial participation of a State Regional Planning Assistance Grant administered by the Connecticut Development Commission.

SOUTHEASTERN CONNECTICUT REGIONAL PLANNING AGENCY

COMPARATIVE REFUSE COLLECTION AND DISPOSAL COSTS

Metcalf & Eddy Engineers & Planners Boston New York Palo Alto San Francisco

FIGURE 5

NOVEMBER, 1967

10 percent of the disposed refuse at municipal facilities is from industries and institutions. The potential exists, therefore, for almost doubling the quantity of industrial and institutional refuse to be disposed of at municipal facilities. Under present conditions, this would amount to approximately 13,000 tons per year of additional refuse.

Industrial and Institutional - Hazardous. The identified sources of hazardous wastes are presently making their own provisions for disposal. There are presently no hazardous wastes disposed of at municipal facilities.

The principal industrial hazardous waste materials are the radioactive wastes of the Electric Boat Division of General Dynamics and the United Nuclear Corporation in Montville. Under present conditions, these wastes are disposed of in accordance with the Atomic Energy Commission Regulations and as approved by State Health and Water Resource officials. The only identified solid wastes are from the atomic fuel used at Electric Boat which, when the fuel energy is spent, is returned to its source for reprocessing.

Other present hazardous industrial wastes are primarily dangerous due to their highly flammable character. These wastes are presently disposed of privately, primarily by open burning under controlled conditions. While the extent of such disposal is relatively limited, there is a need to control air pollution. Therefore, some sort of burning method which will reduce smoke emission to an acceptable level should be substituted for the present open burning.

The only institutional hazardous waste which has been identified is that from the tubercular ward at the Norwich State Hospital. These wastes are burned in the ward incinerator.

Junk Vehicles. At the present time, only three municipalities accept junk automobiles and other junk vehicles at their disposal area. The Town of Groton crushes and buries the junk vehicles along with the other deposited refuse in their sanitary landfill operation. The Towns of Bozrah and Ledyard will accept junk vehicles only if they are cut up. In all other cases, junk vehicles must be disposed of on an individual basis.

A recent report by the Connecticut Development Commission* estimates that Connecticut people presently dispose of approxi-

* Disposal of Automobile Scrap in Connecticut, Connecticut Development Commission, Hartford, Connecticut, Feb. 1967. The estimate in this report of the number of junked automobiles generated each year is based upon surveys by the Connecticut Development Commission of auto wreckers and junk dealers in the state.

mately 110,000 cars per year. Based on the 1965 state population of 2.8 million persons, there is one automobile junked each year for every 25.7 persons. Applying this rate to Southeastern Connecticut, it is estimated that 7,800 automobiles were junked in the region in 1965.

The Town of Groton estimates that only 10 to 20 junked automobiles are brought to the sanitary landfill site per year. Thus, almost all of the 7,800 junk automobiles produced in Southeastern Connecticut in 1965 were disposed of privately, most likely through local junkyards, or via automobile dealer channels.

In addition to the estimated 7,800 automobiles junked in the Southeastern Connecticut region in 1965, there is a backlog of junk vehicles from previous years which has not yet been disposed of. Through the cooperative efforts of the Connecticut Development Commission, we conservatively estimate that 24,000 junk vehicles were scattered through Southeastern Connecticut in 1965. The majority of these were grouped in junk yards and auto wrecker dealers.

Sewage Solids. Sewage solids pumped from septic tanks and cesspools, called "night soil," can be taken to the municipal refuse disposal facilities in East Lyme and Groton. In New London and Norwich, sewage solids may be taken to the city sewage treatment plants. In Waterford, a special site has been established by the Southeastern Connecticut Pumpers Association. The residents of all other communities must dispose of their septic tank and cesspool pumpings privately.

Although not properly considered a solid waste, sewage solids ultimately require incineration. Grit and sludge from sewage treatment plants should be so disposed. The sewage solids from septic tanks and cesspools should be treated at a sewage treatment plant before coming out as grit and sludge for incineration.

At times, sewage treatment plants are built with on-site incinerators for sludge disposal. Where this occurs, sludge disposal at central refuse incinerators will not be required. However, for purposes of this report, future refuse quantity estimates are based upon central incinerators accepting the total quantity of sewage solids. These central incinerators must have the special design equipment necessary for burning sludge.

Other Special Wastes. The only other special waste is fly ash. The Montville power generating plant of the Connecticut Light and Power Company is the only source of fly ash identified in the region. Presently, approximately 46,500 tons per year*

* This estimate is based on information received from the Connecticut Light and Power Company.

are disposed of privately at a dump near the Montville-Norwich border. The site was put into use recently and has been approved by the Connecticut State Department of Health.

Other sites have been used in the past (indications are that some of these sites are still being used) which were not operated with due respect for water pollution control. As is the case with other refuse types, adequate control and enforcement of controls are a necessity in the prevention of pollution.

The problems in the past have resulted primarily from the following:

1. The lack of effective legal controls,

2. The lack of enforcement where controls exist, and

3. The practical difficulty in discovering violators.

In recent years the emphasis on water pollution problems has produced certain necessary legal controls. State Health Department and Water Resources officials now can do much to protect the water resources of the state. However, discovery of violations is still a difficult problem. Local cooperation is most important in this respect.

ESTIMATED FUTURE REFUSE DISPOSAL REQUIREMENTS

The basic consideration in the planning of refuse facilities is an estimate of the quantity of refuse that will be disposed of at the various facilities. In a previous chapter the range of quantities of refuse presently disposed of at the municipal facilities was discussed. Factors affecting such quantities are the types of refuse handled; the number of commercial, industrial, and institutional properties contributing to the quantities; the population served; and the over-all development densities. The estimates of future quantities to be handled by municipal facilities are projections of these quantities based on population projections for the service areas, future commercial and industrial growth, and the estimated effect of contractor and private disposal facilities.

POPULATION GROWTH

The "Recommended Regional Development Plan," published in 1967 by the Southeastern Connecticut Regional Planning Agency, contains population estimates for 1966 and anticipated populations by the year 2000. Within this framework we have estimated

the year-round and the seasonal populations by towns for 1966, and have projected these populations for the years 1980 and 1990. These year-round and seasonal projections are shown in Table 6.

The Southeastern Connecticut Regional Planning Agency's adopted regional development plan contemplates future population distribution similar to that today with emphasis upon the core area. Thus, Groton, New London, and Norwich will continue to dominate as the population centers of the region. However, New London and Norwich will experience relatively minor growth, while Groton is expected to become the most populated town in the region with a 1990 population of approximately 60,000. Adjacent to these population centers, the towns are expected to be strongly influenced toward population densities nearing urban concentrations. The towns so affected will be principally Waterford, Montville, Ledyard, and to some degree Stonington.

INDUSTRIAL AND COMMERCIAL GROWTH

Ordinarily, estimates of future refuse quantities are based on trends in over-all per capita refuse production. These in turn are influenced strongly by the industrial and commercial contributions. Thus, in communities where large amounts of commercial and industrial development exist, the per capita refuse quantities are high; where little or no commercial and industrial development exists, per capita quantities are generally low.

Our estimates of future refuse quantities are based not only on the normal expected increases of domestic refuse per capita, but also on the expected extent of commercial and industrial growth.

Based on the regional development plan for Southeastern Connecticut, the major regional industrial area is proposed for the industrial triangle in Waterford. Other towns which should expect significant industrial growth over the next 25 years are Groton and Norwich. Other municipalities which can expect significant but smaller amounts of industrial growth are Griswold, Stonington, and North Stonington, and to a lesser extent East Lyme and Montville.

The regional development plan has identified Norwich, New London, and Groton as subregional commercial centers to serve the regional population and land use in the year 2000. The subregional centers of Norwich and New London exist as such today. However, a change in the future should occur in Groton as it alters its role from a community to a subregional commercial center.

On the basis of the above discussion, the greatest impact of

Table 6. Estimated Future Population, 1980 and 1990, by Town

Town	1966		1980		1990	
	Year-round	Seasonal	Year-round	Seasonal	Year-round	Seasonal
Bozrah	2,000	same	3,400	same	5,200	same
East Lyme	9,100	18,000	15,400	22,600	21,700	26,800
Franklin	1,100	same	2,200	same	3,600	same
Griswold - Total Town*	7,200	same	9,900	same	13,400	same
(Jewett City)	(4,200)	(same)	(5,500)	(same)	(8,000)	(same)
Groton	35,400	37,400	49,000	51,000	60,000	62,000
Ledyard	10,000	same	20,600	same	30,800	same
Lisbon	2,400	same	3,500	same	4,200	same
Montville	13,000	same	21,300	same	30,000	same
New London	34,000	same	35,500	same	38,000	same
North Stonington	3,200	3,800	7,200	8,000	11,000	11,900
Norwich	41,200	same	47,000	same	56,000	same
Preston (without hospital)	2,700	same	8,100	same	13,500	same
Salem	1,300	2,300	3,600	4,600	5,800	8,100
Sprague	2,700	same	3,900	same	6,000	same
Stonington	15,300	15,800	21,000	22,100	29,500	31,000
Voluntown	1,300	1,800	1,700	2,300	2,300	3,200
Waterford	17,300	17,500	23,600	same	33,200	same
Totals	199,200	217,100	276,900	289,600	364,200	375,600

Source: Estimates by SCRPA

* Includes Jewett City. Jewett City's population is included with the Town of Griswold in arriving at a regional total.

Table 6. Retained Pictures Population, 1970, by Town

Town	1965		1980		1990	
	Year-round	Seasonal	Year-round	Seasonal	Year-round	Seasonal
Bucknell	5,000	same	3,400	same	2,800	same
East Lyme	7,200	18,000	4,500	22,000	2,700	25,800
Prattville	1,500	same	1,200	same	1,000	same
Chiswold - Total Town	4,500	same	3,800	same	3,400	same
(Summit City)	(1,500)	(same)	(2,500)	(same)	(3,400)	(same)
Groton	40,400	37,400	42,400	51,000	44,000	57,000
Ledyard	3,000	same	3,500	same	4,000	same
Lisbon	2,500	same	2,800	same	3,200	same
New London	34,000	5,000	30,000	5,000	25,000	5,000
North Stonington	3,800	same	3,500	same	3,200	same
Norwich	23,000	17,000	21,000	17,000	19,000	17,000
Preston (without Ledyard)	5,200	same	5,000	same	4,800	same
Salem	2,300	same	2,500	same	2,600	same
Sprague	3,500	1,500	3,200	1,700	3,000	1,700
Voluntown	800	same	800	same	800	same
Waterford	12,500	27,200	11,500	32,000	10,500	37,000
Total	157,900	289,600	145,600	357,500	134,200	442,300

Source: Derived by SCRPA, "Growth Outlook & Population Projections for Towns of Southeastern Connecticut", 1965.

* Projected Growth Outlook & Population with the Town of Chiswold as a regional center.

new commercial and industrial development should occur in Groton and Waterford. Although significant amounts of commercial and industrial development will occur in Norwich, its proportionate ratio between commercial and industrial development and population should not change appreciably and, therefore, not affect per capita refuse production beyond the normal yearly increases. New London, with 71 percent of its total land area developed, should retain approximately the same ratio between residential development and commercial and industrial development.

FUTURE REFUSE QUANTITIES

The per capita refuse quantities estimated for municipal disposal facilities in the years 1980 and 1990 are given in Table 7*. These are based on increases ranging from 1.1 to 1.6 times the present per capita refuse quantities. The specific factors determining the growth rate are the regional development plan and the areas of likely industrial and commercial growth. The estimates have also been based on a decrease in the private disposal of refuse as rural towns become more developed; a constant level of refuse handled by contractor facilities; and the continuance of the same ratio between privately disposed industrial and institutional wastes and those industrial and institutional wastes disposed of at municipal facilities.

In addition, adjustments have been made in cases where municipal refuse disposal facilities presently handle only limited refuse types, for example, only garbage and rubbish, excluding bulky wastes, construction and demolition wastes, etc.; also in cases where significant amounts of special wastes, such as junk automobiles, are being handled. In such cases, adjustments were made so that the estimated future quantities include ordinary garbage, rubbish, ashes, street refuse, and construction and demolition wastes. Excluded are junk vehicles, and sewage solids.

Table 8 shows the total estimated refuse quantities which are expected to be a municipal responsibility in 1980 and 1990. These quantities in tons per year are based on estimated future population and future per capita refuse quantities (Tables 6 and 7).

In 1990, there is estimated to be 368,600 tons** of refuse

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* Franklin and Griswold (town) are included in the estimates of future refuse quantities since it is expected that at some time during the planning period (to 1990) these towns will be required to provide municipal disposal service, either at a municipal facility or through participation in a regional facility.

** This amount does not include the estimated quantity of junk automobiles or fly ash.

Table 7. Future Per Capita Refuse Quantity, Municipal Refuse Facilities

Town	Per Capita Refuse Quantity (lb. per capita per cal. day.) 1966	1980	1990
Bozrah	3.0	3.4	3.6
East Lyme	3.3	3.9	4.3
Franklin (1)	2.0	2.2	2.4
Griswold: Jewett City	3.5	4.1	4.6
Rest of Town (1)	2.0	2.5	2.8
Groton	5.4	6.0	6.5
Ledyard	3.0	3.5	3.9
Lisbon	2.5	2.8	3.0
Montville	4.4	5.1	5.7
New London	3.3	3.9	4.3
North Stonington	2.0	2.5	2.8
Norwich	4.0	4.9	5.6
Preston	2.0	2.4	2.6
Salem	2.6	2.9	3.1
Sprague	6.4	6.8	7.0
Stonington	4.0	4.9	5.6
Voluntown	2.0	2.2	2.4
Waterford	2.4	3.2	3.8

(1) Franklin and Griswold (town) outside of Jewett City are expected to provide municipal disposal service, either by a municipal facility or by participation in a regional facility, at some time during the planning period (to 1990).

Source: Estimates by Metcalf & Eddy

Table 7. Future Per Capita Refuse Quantity,
Municipal Refuse Facilities

Per Capita Refuse Quantity
(lb. per capita per cal. day.)

Town	1966	1980	1990
Bozrah	3.0	3.4	3.6
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Griswold: Jewett City	3.5	4.1	4.6
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Groton	5.4	6.0	6.5
Ledyard	3.0	3.5	3.9
Lisbon	2.5	2.8	3.0
Montville	4.4	5.1	5.7
New London	3.3	3.9	4.3
North Stonington	2.0	2.5	2.8
Norwich	4.0	4.9	5.6
Preston	2.0	2.4	2.6
Salem	2.6	2.9	3.1
Sprague	6.4	6.8	7.0
Stonington	4.0	4.9	5.6
Voluntown	2.0	2.2	2.4
Waterford	2.4	3.2	3.8

(1) Franklin and Griswold (town) outside of Jewett City are expected to provide municipal disposal service, either by a municipal facility or by participation in a regional facility, at some time during the planning period (to 1990).

Source: Estimates by Metcalf & Eddy

Table 8. Total Estimated Future Refuse Quantity (1)

Disposal facilities	Tons per year (2) 1980	1990
Municipal		
Bozrah	2,100	3,400
East Lyme	12,200	18,100
Franklin	900	1,600
Griswold - Jewett City	4,100	6,700
Rest of Town	1,900	2,600
Groton	54,400	72,000
Ledyard	13,200	21,900
Lisbon	1,800	2,300
Montville	19,800	31,200
New London	25,300	29,900
North Stonington	3,400	5,700
Norwich	42,100	57,400
Preston	3,600	6,700
Salem	2,000	3,400
Sprague	4,800	7,700
Stonington	19,000	30,200
Voluntown	700	1,100
Waterford	13,800	23,000
Subtotal	225,100	324,900
Contract facilities	8,000	8,000
Private facilities	22,400	35,700
Outside region	-	-
Grand total	255,500	368,600

(1) These quantities do not include estimated tonnage of junk automobiles or fly ash.
(2) Includes seasonal contributions where appropriate.

Source: Estimates by Metcalf & Eddy

produced in Southeastern Connecticut. This is an increase of 129 percent or 207,607 tons over 1966.

CONTRACT AND PRIVATE DISPOSAL

The present quantity of refuse disposed of by contract, privately, and outside the region has been estimated to be 23,312 tons in 1966. This is approximately 14 percent of the total refuse produced in the region.

The estimates of future refuse quantities are based on the following assumptions with respect to contract, private, and outside-the-region disposal of refuse.

1. All refuse now disposed of outside the region will eventually be disposed of inside the region beginning at some time during the planning period.

2. The proportion of refuse disposed of privately will decrease due to the shift in much domestic refuse in the rural areas from private disposal to municipal disposal, as the towns develop.

3. The proportion of industrial and institutional refuse disposed of privately will remain proportionately the same.

4. The volume of refuse handled by contractor services will remain at approximately the same level as today.

FUTURE QUANTITIES OF SPECIAL REFUSE TYPES

Solid wastes which are not included in the previous section on future quantities of ordinary refuse, are junk vehicles, sewage solids, and fly ash. Septic tank and cesspool pumpings are not considered solid wastes and should be disposed of at sewage treatment plants. The screened solids and grit from sewage treatment plants are solid wastes which should be disposed of in landfills. Sewage sludge from treatment plants should be incinerated.

Special industrial wastes of a wide variety are common today. Some of these could become a factor in the region in the future. Industry is now taking care of its own special wastes rather than it becoming a municipal responsibility.

It is impossible to determine the extent of special industrial wastes in the future. It can be expected that industries will continue to take care of their own special wastes. This practice should be continued throughout the region during the

planning period (to 1990). The future refuse disposal plan is based on this assumption.

Whereas the current rate of junk car production is one car per year for every 25.7 people, it was estimated as one car per year for every 35.35 people in 1955. It is highly unlikely that this rapid rate increase will continue. We have, therefore, estimated that the rate of production for junk vehicles in 1980 and 1990 will be one car for every 18 persons and 16 persons respectively. Thus, there will be 15,300 junk vehicles per year discarded in Southeastern Connecticut in 1980. By 1990, there should be 23,000 junk vehicles per year discarded.

Sewage solids are estimated to be produced prior to any treatment at the rate of 0.25 lbs. per capita per day. By 1990, the projected rate of production is estimated as 0.30 lbs. per capita per day. On this basis, it is estimated that the total region will produce prior to any treatment 15,800 tons of sewage solids in 1980, and 20,300 tons in 1990. Assuming secondary treatment of all sewage, which should remove approximately 95 percent of all sewage solids, the quantity of sewage solids to be disposed of in 1980 and 1990 will be 15,000 tons and 19,300 tons respectively.

The only significant source of fly ash in the region is the Montville power generating station of the Connecticut Light and Power Company. The company is in the process of converting their service to atomic generated power to be obtained from power plants inside the region. The conversion will not be total, with the Connecticut Light and Power Company keeping one coal-burning unit in operation through 1990. According to their own estimates,* the quantity of fly ash from the Connecticut Light and Power Company Montville Plant will reduce from approximately 45,000 tons in 1967, to 27,000 tons in 1970. From 1970 to 1990, the annual quantity should remain at approximately 27,000 tons.

ADEQUACY OF EXISTING DISPOSAL METHODS AND LOCATIONS FOR PRESENT AND FUTURE USE

STANDARDS

Table 9 sets forth recommended standards for general refuse disposal methods in Southeastern Connecticut. It is by these standards that the adequacy of existing municipal disposal operations are evaluated.

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* Information received by Metcalf & Eddy from Connecticut Light and Power Company.

Table 9. Standards for General Refuse Disposal Methods

Item	Recommended standards
Acceptable methods of general refuse disposal	Central incineration or sanitary landfill
Acceptable methods of disposal for particular refuse types	Shredding, garbage grinding, hog feeding, on-site incineration, salvage and reclamation
Period of design:	
Central incineration	25 years
Sanitary landfill	25 years or for any shorter period at the end of which the sanitary landfill method of disposal is planned for termination
Location:	
Central incineration	Industrial zone, near center of served population
Sanitary landfill	Industrial zone; low density or rural residential acceptable if buffered, if accessible by arterial or collector street normally expected to carry truck traffic, and if not infringing upon required recreation and conservation areas; near as practical to center of served population; minimum of 50 feet from water body
Physical site characteristics:	
Size: Central incineration	2 acres minimum plus area for residue landfill if appropriate
Sanitary landfill	1.0 to 1.5 acre-feet per 1,000 population per year including cover (standard should be reduced where a sanitary landfill is used for incineration residue)
Soils and topography:	
Central incineration	Soils suitable for excavation and supporting foundations; slopes

	generally 0 to 10 percent except in cases where hillside can be appropriately used to locate dumping floor above storage pit
Sanitary landfill	Soils mostly sand and gravel to good depth, suitable for use as cover material; slopes generally 0 to 15 percent
Utilities:	
Central incineration	Major water supply required. Waste water disposal facilities required. Electric power and possibly gas required
Sanitary landfill	Water for fire protection required

Source: Standards recommended by Metcalf & Eddy

EVALUATION OF PRESENT MUNICIPAL DISPOSAL FACILITIES

Municipal facilities are presently used to dispose of approximately 86 percent of all refuse* produced in Southeastern Connecticut. Estimates of future refuse quantities have been made previously, assuming a slight decrease in the proportion of privately disposed and contractor disposed refuse to municipally disposed refuse. Thus, it has been concluded that by 1980 and 1990 municipal disposal facilities will be required to handle 225,000 tons and 325,000 tons of refuse per year, respectively, or approximately 88 percent of the total refuse produced in the region. The purpose of this section of the report is to evaluate existing municipal disposal facilities to determine their adequacy in satisfactorily disposing of predicted future refuse quantities.

With the exception of the New London incinerator, the method of disposal for all municipally disposed refuse is some form of dumping - either sanitary landfill, modified sanitary landfill or open dumping. For this reason, the estimated future refuse quantities have been converted to cumulative refuse volumes so that the available space at existing municipal disposal facilities may be related to the volumes from the present to 1990. The estimated cumulative compacted volumes of refuse from the present to 1980 and to 1990 are given in Table 10.

* Here as in previous sections, the junk automobiles and fly ash are excluded.

Table 10. Cumulative Volumes of Refuse (1)

Municipal facility	Volume of accumulated refuse, acre-feet 1980	1990
Bozrah	40	89
East Lyme	235	503
Franklin	16	38
Griswold: Burdick facility	72	154
Old Borough facility	12	26
Rest of Griswold	37	77
Groton	1,113	2,319
Ledyard	231	541
Lisbon	36	72
Montville	374	826
New London: Bates Woods	156	290
North Stonington	57	138
Norwich	845	1,676
Preston	53	134
Salem	34	90
Sprague	98	209
Stonington	374	813
Voluntown	17	37
Waterford	264	589
Total	4,064	8,621

(1) After compaction but before covering.

Figure 6 graphically shows the relationships between the cumulative volume of refuse with cover material and available space by municipality.*

While this is a most important consideration in evaluating the existing facilities, it is not the sole factor determining

* For long-range considerations for the Southeastern Connecticut Region, it is necessary to provide for the disposal of refuse produced in Franklin and Griswold outside of Jewett City. While the present method of disposal (disposal outside the region) is acceptable, assuming the disposal site is operated according to state law, the possibility exists that this present site will become closed to these towns. At such time, other arrangements for refuse disposal must be made by the towns. For this reason, projections of the cumulative volume of refuse for these areas are given on Figure 6 for use in our future planning.

Table 10. Cumulative Volume of Refuse (1)

Municipal facility	1980	Volume of accumulated refuse, acre-feet 1990
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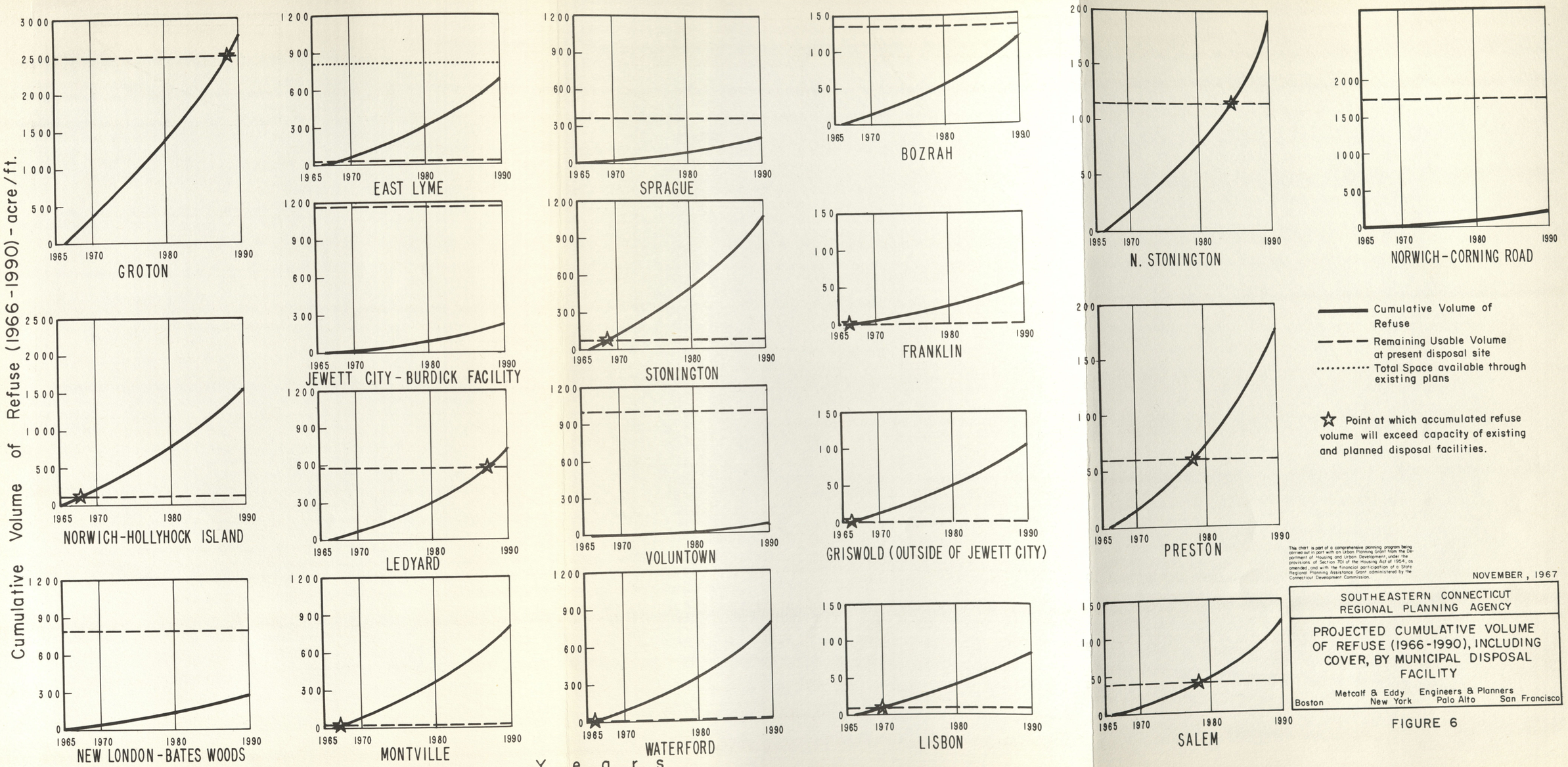

This chart is part of a comprehensive planning program being carried out in part with an Urban Planning Grant from the Department of Housing and Urban Development under the provisions of Section 701 of the Housing Act of 1954, as amended, and with the financial participation of a State Regional Planning Assistance Grant administered by the Connecticut Development Commission.

NOVEMBER, 1967

SOUTHEASTERN CONNECTICUT REGIONAL PLANNING AGENCY

PROJECTED CUMULATIVE VOLUME OF REFUSE (1966-1990), INCLUDING COVER, BY MUNICIPAL DISPOSAL FACILITY

Metcalf & Eddy Engineers & Planners
Boston New York Palo Alto San Francisco

FIGURE 6

their adequacy. Each municipal disposal facility is also evaluated according to such factors as whether the present method of disposal is acceptable or not acceptable, location with respect to existing land use, the regional development plan and population centers, and physical site characteristics, particularly topography and soil.* These factors of evaluation have been used to group the various municipal refuse disposal facilities according to their remaining useful life. Such groupings are directed toward the over-all plan objective of meeting Southeastern Connecticut's immediate, 1980, and 1990 refuse disposal needs.

The various municipal refuse disposal facilities have been grouped under the following categories:

1. Sites recommended for abandonment by 1970.

2. Sites recommended for abandonment by 1980.

3. Sites recommended for abandonment by 1990.

4. Sites suitable for continued use through 1990 with moderate corrections in disposal methods.

5. Sites suitable for continued use through 1990.

The classification of each municipal facility is shown on Figure 7. The basis for classifying each facility is the inventory material presented in Table 1. Each facility is discussed below under its classification grouping.

1. Sites Recommended for Abandonment by 1970. These sites include those which should be discontinued immediately due to an unacceptable method of disposal and characteristics that make them unsuitable for conversion to a suitable disposal method (municipal facilities serving Bozrah, Jewett City ((Old Borough Dump)), Lisbon, and North Stonington. Also included are those sites which could use or are using an acceptable method of disposal but which will have reached saturated capacity by 1970 (municipal facilities serving Montville, Stonington, Waterford, and the Hollyhock Island disposal facility in Norwich).

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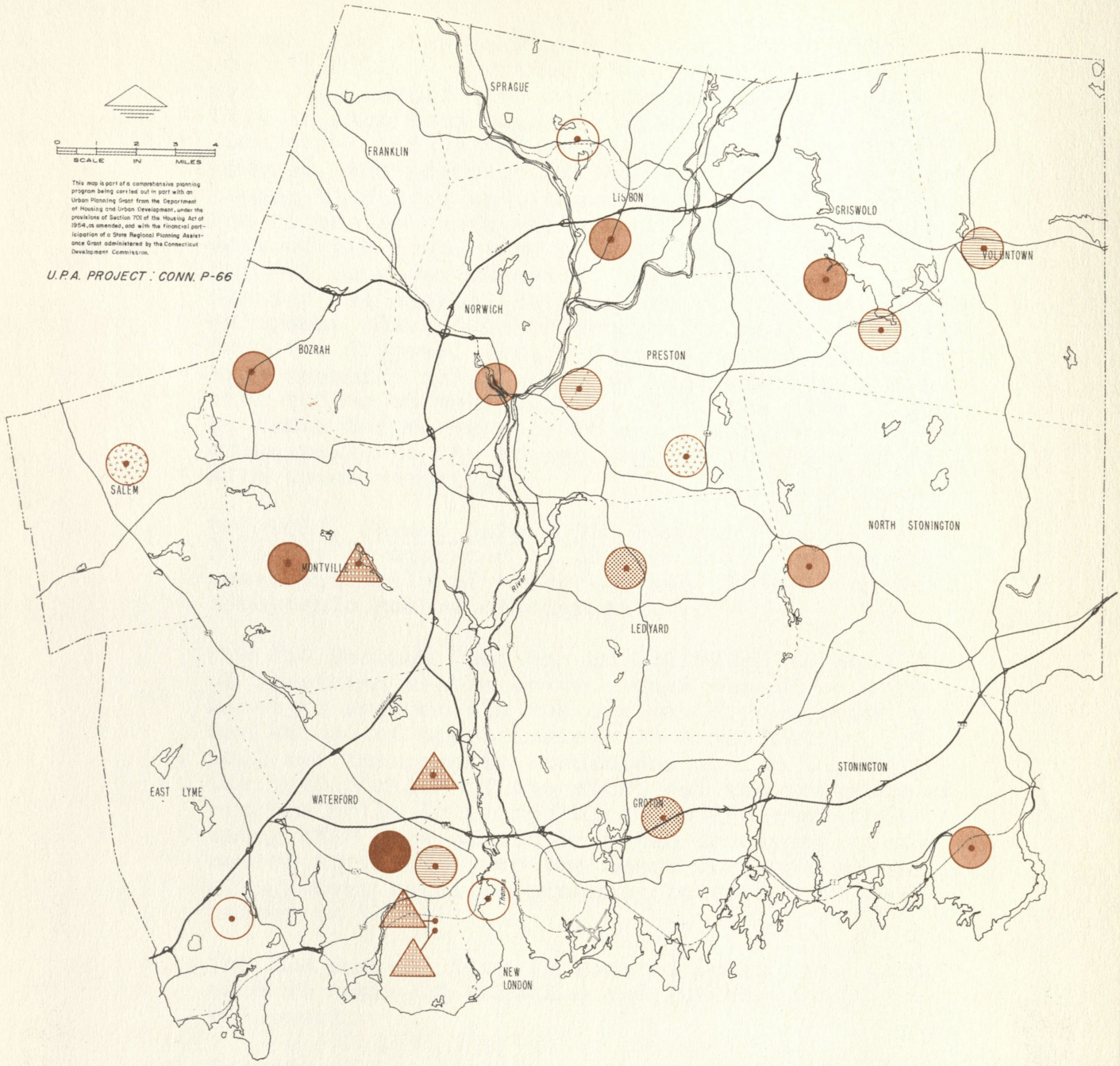
* These evaluations do not indicate that the particular facility is necessarily the most suitable to economically and efficiently serve the region in the future. They do indicate the extent to which each facility could be acceptable as a disposal method and operation if compatible with the overall plan.

SOUTHEASTERN CONNECTICUT REGION



MUNICIPAL FACILITIES	CONTRACT FACILITIES
Sites recommended for abandonment by 1970	None
Sites recommended for abandonment by 1980	None
Sites recommended for abandonment by 1990	None
Sites suitable for continued use through 1990 with moderate corrections in disposal methods	
Sites suitable for continued use through 1990	None

NOTE:

These evaluations do not indicate that the particular facility is necessarily the most suitable to economically and efficiently serve the region in the future. They do indicate the extent to which each facility could be acceptable as a disposal method and operation if compatible with the overall plan.

SOURCE:

Information based on field survey by Metcalf & Eddy - October, November 1966, and data supplied by the State Health Department - December, 1967

EVALUATION OF MUNICIPAL AND CONTRACTOR REFUSE DISPOSAL FACILITIES

PREPARED BY METCALF & EDDY ENGINEERS • PLANNERS
BOSTON • NEW YORK • PALO ALTO • SAN FRANCISCO
NOVEMBER, 1967

FIGURE 7

Bozrah. As seen on Figure 6, the Bozrah refuse disposal facility, operated as an open dump, has an estimated future site capacity of 135 acre-feet. This is more than adequate to handle the estimated cumulative refuse volume of 118 acre-feet* by 1990. However, the majority of this capacity is in depth rather than area and, therefore, cannot be realized due to the necessity of sloping and covering the face of the dump. The on-site soil is not suitable for use as cover material. The recommended low-density residential development on the regional development plan would be compatible only if buffered from the disposal area. Thus, although the future site capacity is adequate to meet expected cumulative refuse volumes through 1990, the site is unsuitable for conversion to a sanitary landfill due principally to the topography and the lack of on-site cover material.

Griswold, Jewett City - Old Borough Dump. This facility is operated as an open dump for the disposal primarily of bulky wastes. This is an unacceptable method of disposal.

The Old Borough Dump has an estimated 44 acre-feet of remaining usable space. This should be sufficient to accommodate the estimated cumulative refuse volume of approximately 35 acre-feet by 1990. Soil and topographic conditions are suitable on the used portion of the site, but the presence of organic soils in swampy areas to the east indicates that care should be taken in expanding the use of this site into the heretofore unused area. Also, cover material probably could not be obtained on the site.

The Old Borough Dump is located in an area acceptable in terms of existing and future planned development.

Because of the disposal method and the unsuitable site conditions, this facility is recommended for abandonment by 1970.

Lisbon. Lisbon's present open dumping disposal method has an estimated remaining usable volume of 10 acre-feet. As was shown on Figure 6, this space is sufficient only to 1969. Although the existing site is suitable in terms of soil and

* Here, as well as in all other evaluations, the cumulative volume of refuse compared with available space includes cover material.

topographic features (on-site cover material is not available), expansion of the existing site does not appear feasible because much of the adjacent soil is organic and wet.

The area is proposed in the regional development plan for future low-density residential development. Thus, because of the need for additional space by 1969 and the unacceptable method of disposal now in use, the existing disposal facility in Lisbon is not suitable for continued use.

North Stonington. North Stonington's open dump disposal facility has an estimated remaining usable space of 120 acre-feet which should be sufficient to last the town through 1987. However, topographic conditions are such that the majority of the available space is in depth and is probably overstated due to the necessity of sloping and covering dump faces. Soils in the area are not suitable for cover material, requiring suitable material to be hauled from a distance of two miles.

Since the present method of disposal is inadequate, and the site is unsuitable for use as a sanitary landfill, the present facility is classified as unacceptable for continued refuse disposal operation.

Stonington. The Stonington refuse disposal facility, operated as a modified sanitary landfill, has an estimated future usable area of 88 acre-feet. This space is sufficient to accommodate cumulative refuse from Stonington to some time in 1968. Soils in the area are shallow to bedrock, with some stony to extremely stony. The site is proposed for future low-density residential development. Thus, because of the unacceptable disposal method, the absence of on-site cover material, the immediate need for expanded capacity, and the inadequate soils for expansion of the site at its present location, the Stonington refuse disposal site is recommended for abandonment by 1970.

Montville. The remaining usable space at the Montville modified sanitary landfill has been estimated to be 32 acre-feet, which will probably be filled by sometime in 1968. Topography and soils in the area are generally suitable on the existing site but limit expansion beyond its present boundaries. The location is in an area presently rural in nature but proposed for medium-density residential

use in the regional development plan. Thus, the Montville refuse disposal site will reach saturation in the next few years, and provision of more refuse disposal capacity is an immediate need. This additional space should be provided at another location.

Norwich - Hollyhock Island. The Hollyhock Island sanitary landfill has a remaining capacity of 120 acre-feet which should last Norwich only through 1968. The location, in an existing and a proposed industrial area, is very suitable, but the remaining usable area limits the future of this facility. Thus, it is recommended for abandonment when its remaining capacity is depleted (by 1970).

Waterford. The remaining usable space at the Waterford modified sanitary landfill is extremely small and the facility could not be expected to last beyond 1967. Adjacent areas are not suitable for expanding the existing facility due to both soil conditions and the regional development plan proposing high-density residential development. Therefore, the Waterford refuse disposal facility will need replacement almost immediately.

2. Sites Recommended for Abandonment by 1980. Although these facilities are suitable disposal sites, through conversion to an acceptable method of disposal, by 1980 they will have depleted their available capacity. The facilities included are those serving Preston and Salem.

Preston. Preston presently operates a modified sanitary landfill which can easily be converted to a sanitary landfill. This would mean compacting and covering deposited refuse on the same day on which it is dumped. The site is located in a rural predominantly undeveloped area which is proposed for medium-density residential use as part of the regional development plan.

The remaining usable volume of 60 acre-feet should be sufficient to handle cumulative refuse in Preston through 1978. Although cover material is presently hauled to the site over a distance of four or five miles, a factor influencing disposal costs, the site should be thoroughly investigated for possible use of the trench method of sanitary landfill. Should soils be suitable, there would be a considerable saving in the operation of the site. Even if it is necessary to continue hauling cover material,

a new or expanded site should not be required until about 1978.*

Salem. Salem, operating a modified sanitary landfill, should convert its present disposal method to a complete sanitary landfill operation. The estimated future usable space, approximately 40 acre-feet, is sufficient to accommodate the cumulative volume of refuse through 1978. The site's location is compatible with the proposed very low-density development in the future. The physical characteristics necessitate that cover material be hauled to the site for the disposal of refuse by the sanitary landfill method. However, because of the available capacity, the site's location and the ease of converting to a sanitary landfill, i.e., covering daily as opposed to weekly, it is recommended that this facility remain in use until it reaches saturation in about 1978.

3. Sites Recommended for Abandonment by 1990. Facilities which are now utilizing or through conversion can utilize an acceptable method of disposal, but which will have depleted their available capacity between 1980 and 1990, are included in this category.

Groton. Only the Groton sanitary landfill falls into this category. According to our estimates, the existing usable space of 2,500 acre-feet will be depleted by 1988, requiring either expansion at the same location or a new location.

The disposal site is suitably located in an area proposed for industrial use on the regional development plan. Soils may produce a problem in the future. There are wet areas and a large part of the site is underlain with rock ledge. There is no on-site cover material available. Thus, cover must be hauled in. The town's present cost of disposal is relatively reasonable, due largely to the town's ability to purchase cover material at an extremely low cost and haul it over a distance of about one mile. The availability of cover material at a reasonable cost and at a reasonable distance could in the future be a significant

* This evaluation is based on the physical capabilities of the site only and does not mean that continued operation of this site will necessarily be the least expensive means of refuse disposal for Preston.

factor affecting Groton's over-all cost of refuse disposal. Thus, while the method and location of disposal are completely adequate through 1988, the operating costs could become high.

Ledyard. The Ledyard sanitary landfill has an estimated remaining usable space of 590 acre-feet. This is adequate space to handle the estimated cumulative refuse volume through 1987. Soils are shallow to bedrock, requiring cover material to be hauled to the site. This location requires substantial buffering from future residential development as proposed on the Regional Development Plan. With these qualifications, the present disposal site is acceptable for continued use in Ledyard.

4. Sites Suitable for Continued Use Through 1990 with Moderate Corrections in Disposal Methods. The sites included in this category are physically suitable for conversion to sanitary landfill, have the availabel capacity, and are suitably located for continued use throughout the planning period. The municipal facilities are the Burdick facility serving Jewett City, the New London Bates Woods facility, the Corning Road facility in Norwich, and the Voluntown refuse disposal facility.

Griswold, Jewett City - Burdick Facility. The Burdick disposal facility, presently operated as an open dump, has a remaining usable capacity of approximately 1,180 acre-feet. This is more than adequate to handle the cumulative refuse volume of 206 acre-feet by 1990. Soil and slope conditions are suitable for the operation of a sanitary landfill. Also, the area is recommended for very low density development in the regional development plan. Thus, although the present disposal method is not acceptable, the site is suitable for conversion to the sanitary landfill method of disposal. As such, the site and operation will be acceptable for continued use throughout the planning period.

New London - Bates Woods. The Bates Woods modified sanitary landfill, which should be converted to a true sanitary landfill, is located approximately two miles from the New London incinerator. It is in an area proposed on the regional plan as future open space and very low density development. It is reasonably accessible from the incinerator and the service area. There is, however, a distance of approximately six miles over which cover

material must be hauled to the site.

The remaining usable area of approximately 800 acre-feet is more than adequate to meet the 1990 estimated cumulative volume of 342 acre-feet. Topography in the area is suitable, but soils are such that cover material must be hauled in. Thus, while the space for disposal is available for the estimated cumulative volume of the next 25 years, the lack of on-site cover material will adversely affect the unit costs of operation. However, this is not a serious consideration in New London where the principal refuse to be disposed of by landfill is the residue from the city's incinerator.

Norwich - Corning Road. The operation of the disposal facility at Corning Road as an open dump with burning is not acceptable. Although this facility is used only for the disposal of construction and demolition wastes and bulky wastes, the extensive open burning which occurs is not allowed under the present law. The site is located in an undeveloped area but is adjacent to an existing medium-density residential area. The regional development plan proposes very high density residential development in this area. Access to the site over a predominantly residential road is not desirable.

The site is 70 acres in size and has a remaining usable volume of 1,750 acre-feet, more than sufficient to handle the cumulative refuse volume of approximately 270 acre-feet by 1990. Portions of the site have soils which are suitable for use as cover material. Soil from this site is presently hauled to the Hollyhock Island landfill for use as cover.

While certain inadequacies exist with respect to the existing operation and existing and proposed land use, this site appears physically acceptable for a properly operated refuse disposal facility, adequately buffered and operated, for the future of Norwich. Its location, however, is highly questionable since access roads pass through existing residential areas.

Voluntown. Voluntown's refuse disposal facility is presently operated as a modified sanitary landfill, which should be converted. However, the site is located in a predominantly rural area and in an area proposed on the regional development

material must be hauled to the site.

The remaining usable area of approximately 900 acre-feet is more than adequate to meet the 1990 estimated cumulative volume of 342 acre-feet. Topography in the area is suitable, but soils are such that cover material must be hauled in. Thus, while the space for disposal is available for the estimated cumulative volume of the next 25 years, the lack of on-site cover material will adversely affect the unit costs of operation. However, this is not a serious consideration in New London where the principal refuse to be disposed of by landfill is the residue from the city's incinerator.

Norwich - Corning Road. The operation of the disposal facility at Corning Road as an open dump with burning is not acceptable. Although this facility is used only for the disposal of construction and demolition wastes and bulky wastes, the extensive open burning which occurs is not allowed under the present law. The site is located in an undeveloped area but is adjacent to an existing medium-density residential area. The regional development plan proposes very high density residential development in this area. Access to the site over a predominantly residential road is not desirable.

The site is 70 acres in size and has a remaining usable volume of 1,750 acre-feet, more than sufficient to handle the cumulative refuse volume of approximately 270 acre-feet by 1990. Portions of the site have soils which are suitable for use as cover material. Soil from this site is presently hauled to the Holyhock Island landfill for use as cover.

While certain inadequacies exist with respect to the existing operation and existing and proposed land use, this site appears physically acceptable for a properly operated refuse disposal facility, adequately buffered and operated, for the future of Norwich. Its location, however, is highly questionable since access roads pass through existing residential areas.

Voluntown. Voluntown's refuse disposal facility is presently operated as a modified sanitary landfill, which should be converted. However, the site is located in a predominantly rural area and in an area proposed on the regional development

plan for very low density development. The 1,000 acre-feet of usable area available should last Voluntown well beyond the 1990 planning period target date.

Soil and slope conditions are suitable for the operation of a sanitary landfill. Thus, the site can be easily converted to such an operation. The present facility should be converted to a sanitary landfill and continued in operation throughout the planning period.

5. Sites Suitable for Continued Use Through 1990. These facilities are presently employing a suitable disposal method; they have adequate available capacity; and their locations are suitable with respect to existing land use and the regional development plan. The municipal facilities included under this classification are the sanitary landfills in East Lyme and Sprague. The New London incinerator is classified under this heading even though a new incinerator will probably be required at some time during the planning period.

East Lyme. The present East Lyme sanitary landfill site will last only from one to two years because it is limited by the 24 acre-feet of available space. However, as shown on Figure 6, existing town plans call for the purchase of adjacent property which would add approximately 800 acre-feet of available disposal space. If the town implements its present plans, as is expected, the total available usable space of 824 acre-feet is more than adequate to handle the cumulative volume of refuse in 1990 of approximately 670 acre-feet. The soil and slope conditions on the existing and the adjacent land area are not the most appropriate for a sanitary landfill operation. Part of the adjacent land is an old quarry which the town intends to fill as part of its disposal operation. This can be acceptable as long as the town is careful to protect the water resources in the area.

The site location is proposed on the regional development plan for very low density development in the future. Thus, from a land use viewpoint, this site is suitable as long as it is buffered from the proposed adjacent medium-density residential development.

While the over-all site is adequate through 1990

plan for very low density development. The 1,000 acre-feet of usable area available should last Voluntown well beyond the 1990 planning period target date.

Soil and slope conditions are suitable for the operation of a sanitary landfill. Thus, the site can be easily converted to such an operation. The present facility should be converted to a sanitary landfill and continued in operation throughout the planning period.

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East Lyme. The present East Lyme sanitary landfill site will last only from one to two years because it is limited by the 24 acre-feet of available space. However, as shown on Figure 6, existing town plans call for the purchase of adjacent property which would add approximately 800 acre-feet of available disposal space. If the town implements its present plans, as is expected, the total available usable space of 824 acre-feet is more than adequate to handle the cumulative volume of refuse in 1990 of approximately 670 acre-feet. The soil and slope conditions on the existing and the adjacent land area are not the most appropriate for a sanitary landfill operation. Part of the adjacent land is an old quarry which the town intends to fill as part of its disposal operation. This can be acceptable as long as the town is careful to protect the water resources in the area.

The site location is proposed on the regional development plan for very low density development in the future. Thus, from a land use viewpoint, this site is suitable as long as it is buffered from the proposed adjacent medium-density residential development.

While the over-all site is adequate through 1990

on the basis of available space for refuse disposal, assuming the town purchases and uses the adjacent property, the site will be relatively expensive to operate as a landfill because of the necessity of hauling in cover material, possible site preparation measures, and continual guard against water pollution.

Sprague. The Sprague sanitary landfill operation is located adjacent to presently used industrial land which is proposed in the regional development plan for future industrial use. The estimated remaining usable space is 300 acre-feet which should be sufficient to accommodate the estimated 1990 cumulative volume of refuse of approximately 210 acre-feet. The site is very suitable for the operation of a sanitary landfill, with good sand and gravel available on the site for cover material and slopes suitable for a variety of sanitary landfill methods, such as the trench method and the ramp method. Thus, the Sprague sanitary landfill is acceptable for use throughout the entire planning period.

New London - City Incinerator. The New London incinerator was built in 1940 with a design capacity of 120 tons per 24-hour day. It was estimated at design that this capacity would adequately serve a population of 40,000 persons.

Based on the design capacity and predicted future refuse quantities for New London, Figure 8 shows that the New London incinerator is capable of meeting projected 1990 average daily quantities of 108 tons with 2.7 eight-hour shifts per working day (260 working days per year). To meet peak loads, 3.1 eight-hour shifts per working day* will be required in 1990 to handle the average daily load in the maximum month of 124 tons.

The storage pit at the incinerator has a 50-ton capacity. At peak demand periods, the capacity of the incinerator is limited to 3.25 eight-hour shifts per working day. Since the peak loads estimated for 1990 will require 3.1 eight-hour shifts per day, the New London incinerator capacity is acceptable through 1990.

Although on-site disposal of the incinerator

* Certain overtime work beyond the 5-day week is required to meet these peak loads.

on the basis of available space for refuse disposal, assuming the town purchases and uses the adjacent property, the site will be relatively expensive to operate as a landfill because of the necessity of hauling in cover material, possible site preparation measures, and continual guard against water pollution.

Sprague. The Sprague sanitary landfill operation is located adjacent to presently used industrial land which is proposed in the regional development plan for future industrial use. The estimated remaining usable space is 300 acre-feet which should be sufficient to accommodate the estimated 1990 cumulative volume of refuse of approximately 210 acre-feet. The site is very suitable for the operation of a sanitary landfill, with good sand and gravel available on the site for cover material and slopes suitable for a variety of sanitary landfill methods, such as the trench method and the ramp method. Thus, the Sprague sanitary landfill is acceptable for use throughout the entire planning period.

New London - City Incinerator. The New London incinerator was built in 1940 with a design capacity of 120 tons per 24-hour day. It was estimated at design that this capacity would adequately serve a population of 40,000 persons.

Based on the design capacity and predicted future refuse quantities for New London, Figure 8 shows that the New London incinerator is capable of meeting projected 1990 average daily quantities of 108 tons with 2.7 eight-hour shifts per working day (260 working days per year). To meet peak loads, 3.1 eight-hour shifts per working day* will be required in 1990 to handle the average daily load in the maximum month of 124 tons.

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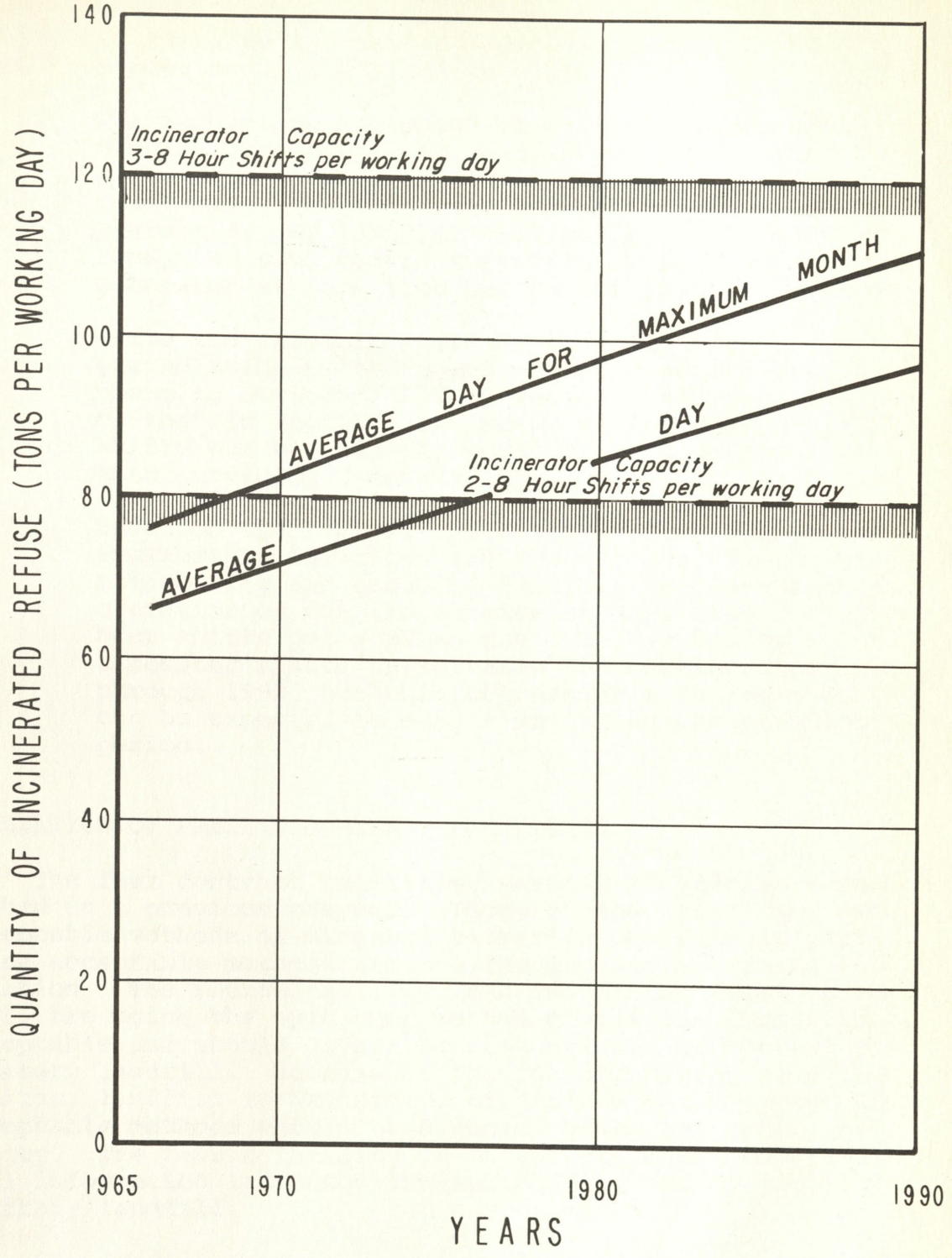


SOUTHEASTERN CONNECTICUT REGIONAL PLANNING AGENCY

This chart is part of a comprehensive planning program being carried out in part with an Urban Planning Grant from the Department of Housing and Urban Development, under the provisions of Section 701 of the Housing Act of 1954, as amended, and with the financial participation of a State Regional Planning Assistance Grant administered by the Connecticut Development Commission.

ESTIMATED FUTURE QUANTITIES OF INCINERATOR REFUSE NEW LONDON INCINERATOR

Metcalf & Eddy Engineers & Planners Boston New York Palo Alto San Francisco

FIGURE 8

NOVEMBER, 1967

residue is not possible, the incinerator location is suitable in terms of land use (industrial), served population, and accessibility.

The mechanical equipment of an incinerator can usually be expected to last 25 years. Any use beyond this period is considered to be on borrowed time. In 1965, the incinerator was 25 years old. By 1990, it will be 50 years old. Thus, the city should expect to replace the incinerator at some time during the planning period.

While the rated incinerator capacity is not expected to be exceeded during the planning period, there is serious question whether the operation of the old facility in excess of 2 eight-hour shifts per working day would be more economical than providing a new facility.

Based on the over-all site suitability for an incinerator location, and the uncertainty of the reliability and economic feasibility of continued operation of the incinerator on more than 2 eight-hour shifts per working day, the New London incinerator's site is suitable for continued use through 1990, but the incinerator's replacement can be expected at some time during the planning period.

EVALUATION OF PRESENT CONTRACT FACILITIES

The four contract facilities serving the region were described in a previous chapter. Three of the facilities employ acceptable methods of disposal either in whole or in part. These acceptable methods are hog-feeding and salvaging and reclamation. The fourth facility, and two of the first three in part, are using the open dump method of disposal which is unacceptable and should either be discontinued or converted to a sanitary landfill. Because of the inappropriate soils for the sanitary landfill in Waterford, all refuse not disposed of by acceptable methods should be disposed of at the municipal facility. The fourth facility is in an area where generalized soil information indicates the suitability for converstion to sanitary landfill.

Hog-feeding is in economic decline generally. The hog-feeding contractors in Southeastern Connecticut may cease operations in the near future, and the area served should be prepared to negotiate a contract utilizing a sanitary landfill disposal method.

It is concluded that all the existing contract facilities can continue in use throughout the planning period with the proper corrective measures.

PART II

RECOMMENDED REFUSE DISPOSAL PLAN

ALTERNATIVE REFUSE DISPOSAL PLANS

SUMMARY OF THE REGIONAL PROBLEM

Through the inventory of the existing refuse systems situation in Southeastern Connecticut, set forth in Part I of this report, individual refuse system situations have been found that may be classified as follows:

1. Municipalities presently having no disposal facilities.

2. Municipalities having disposal facilities, the capacity of which will be depleted before 1990.

3. Existing municipal sites presently unsuitably located with respect to long-range land use proposals and/or for proper disposal operation.

4. Municipal sites suitably located having sufficient capacity through 1990.

The result is that, except in 4 above, municipalities must take action at some time during the planning period. This action may be either unilateral or regional. Required action will consist of (1) locating a new or expanded refuse disposal site, (2) changing the method of refuse disposal, and/or (3) operating the facility properly. Our investigation into the existing situation has resulted in a determination of the timing which is necessary to meet the problems which will occur during the planning period. Thus, the municipalities that will be required to act must do so by 1970, 1980, or 1990.

The problems of the region are summarized on Figure 9, which shows both the nature of the problem and the timing of required action to alleviate the problem.

Special Problems. Two special problems in the region have been identified. These are the problems of disposing of junk automobiles and fly ash. The junk automobile problem is a growing one for the entire region. Fly-ash disposal will become a decreasing but still important problem. Both require special attention along the lines discussed herein.

APPROACH TO REGIONAL REFUSE PROBLEMS

In studying solutions for Southeastern Connecticut regional refuse problems, four general factors have been considered:

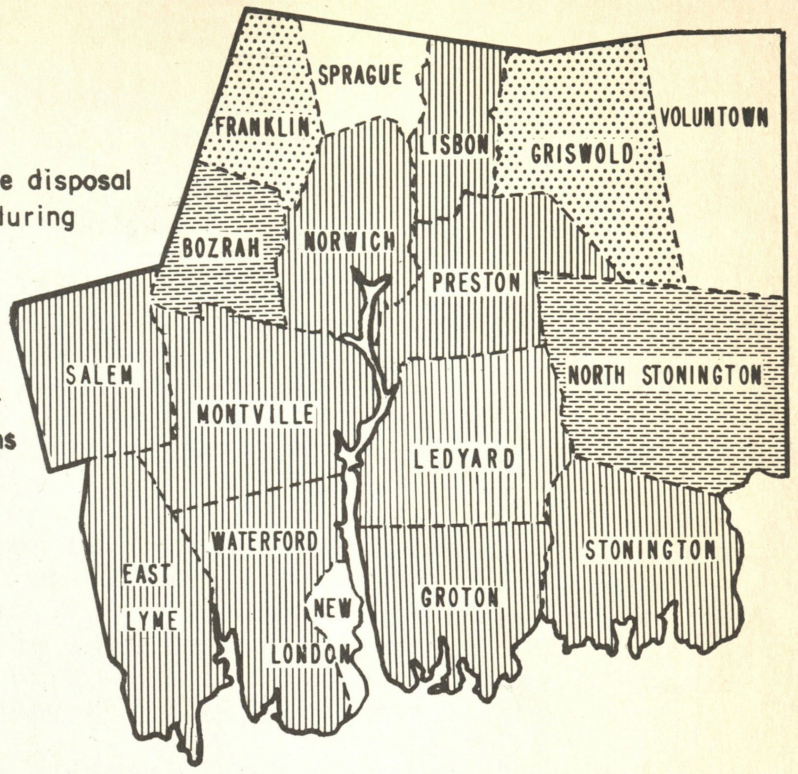
1. Availability of suitable sites, including land use considerations.

Municipality without own disposal facility

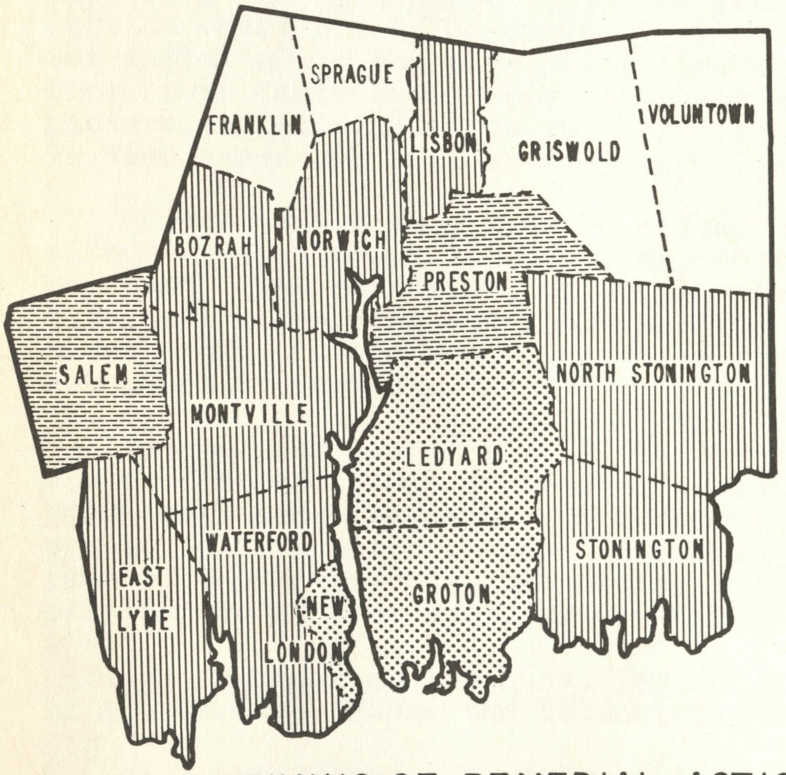
Municipality whose available disposal capacity will be depleted during planning period.

Municipality whose site is unsuitably located for proper disposal operation or future land use considerations

Municipality whose site is suitably located with sufficient capacity



MAP A - STATUS OF DISPOSAL FACILITY



Municipality requiring action by 1970

Municipality requiring action by 1980

Municipality requiring action by 1990

Municipality requiring no action during the planning period.

NOTE: Action in Voluntown, Salem and Preston is required immediately by converting existing disposal operation to a sanitary landfill.

MAP B - TIMING OF REMEDIAL ACTION

SOUTHEASTERN CONNECTICUT REGIONAL PLANNING AGENCY

This chart is part of a comprehensive planning program being carried out in part with an Urban Planning Grant from the Department of Housing and Urban Development, under the provisions of Section 701 of the Housing Act of 1954, as amended, and with the financial participation of a State Regional Planning Assistance Grant administered by the Connecticut Development Commission.

SUMMARY OF MUNICIPAL REFUSE DISPOSAL PROBLEMS AND NEEDS

Metcalf & Eddy Engineers & Planners Boston New York Palo Alto San Francisco

FIGURE 9

NOVEMBER, 1967

2. Political implications.

3. Costs.

4. Flexibility of solutions.

As many municipalities are well aware, the availability of suitable sites for refuse disposal operations can become critical in the over-all long-range planning of facilities. Thus, the more extensive land user, sanitary landfill, may be discouraged in favor of incineration in locations where there is a scarcity of gravel deposits and suitable sites in appropriate existing and proposed land use areas.

Any proposed solution to Southeastern Connecticut's refuse disposal problem must be politically acceptable and workable. For any regional solution, therefore, one must consider the fact that a municipality may be reluctant to participate financially in a regional plan at a time when it has no problem and therefore no inclination to make a financial outlay.

The costs of refuse disposal include capital investment (land, structures, utilities, site development and equipment) and operating costs. Also, consideration of capital and operating costs for collection should be included. In many cases, collection costs are borne directly by the user and therefore are not reflected in any particular municipality's tax rate. However, such costs are a very important part of the total cost picture, especially since they are often of a magnitude of two to five times the cost of disposal.

Costs vary widely because of the many variables which can affect them. In evaluating plans, therefore, averages and ranges are used. The determination of the averages and ranges used was made on the basis of the individual municipalities or location under study. Basic cost data for a wide range of pertinent items are given in Appendix B.

As pointed out in Part I of this report, research in solid wastes disposal could conceivably result in significant changes from present-day concepts. The attempt has been made to incorporate in this plan as much flexibility as deemed practicable so that advantage may be taken of any innovations which have possibilities today that might prove beneficial in the future.

In considering the above factors relevant to our evaluation of alternative plans, the following assumptions have been made:

1. Any disposal facility will be properly operated, that is, operation in accordance with all health and sanitary regulations and with proper equipment, suitable maintenance, etc.

2. Political implications.

3. Costs.

4. Flexibility of solutions.

As many municipalities are well aware, the availability of suitable sites for refuse disposal operations can become critical in the over-all long-range planning of facilities. Thus, the more extensive land user, sanitary landfill, may be discouraged in favor of incineration in locations where there is a scarcity of gravel deposits and suitable sites in appropriate existing and proposed land use areas.

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In considering the above factors relevant to our evaluation of alternative plans, the following assumptions have been made:

1. Any disposal facility will be properly operated, that is, operation in accordance with all health and sanitary regulations and with proper equipment, suitable maintenance, etc.

2. Possible sites will be tested by qualified soil scientists prior to selection.

3. Facilities will be designed by qualified engineers, and the operation will be based on engineering recommendations.

4. While cost data are based on today's prices, unless otherwise noted, it is probable that there will be a continuing rise in labor and construction costs.

5. The responsibility for the disposal of ordinary solid wastes is a public one, and special industrial wastes are private disposal problems that will be controlled by laws protecting the public.

BASIS OF THE PLAN

The basis of alternative regional refuse disposal plans is the Regional Development Plan published by the Southeastern Connecticut Regional Planning Agency in February, 1967 and adopted May 17, 1967. This plan has a target date for the year 2000. It designates areas by land use types and densities, indicates commercial and industrial centers, and recommends highways for serving the proposed land use pattern.

Although this refuse disposal plan has a target date of 1990, the staged development requires that it correspond to the phasing of the Regional Development Plan. Thus, forecasts of population size and distribution for the years 1980 and 1990, and projected industrial land development for the same years have been prepared by the Southeastern Connecticut Regional Planning Agency. These estimates have been used in developing the intermediate and final stages of the refuse disposal plan.

The cooperative efforts of the Soil Conservation Service of the U.S. Department of Agriculture have provided a physical basis for the selection of potential refuse disposal sites.

POTENTIAL REFUSE DISPOSAL SITES

Refuse disposal sites used in this plan have been selected according to the following criteria:

1. The site must be in an area designated for either industrial or very low density land use on the regional development plan. Exceptions are made only where extenuating circumstances dictate.

2. A 50 percent safety factor in size is applied for long-range land area requirements. This is because the ab-

sence of on-site topographic surveys makes it necessary to use average depth figures.

3. Soils must meet the classification of Grade A on the general soils maps prepared by the Soil Conservation Service. This classification is defined as soils of terraces, predominantly excessively well and moderately well drained soils over sand and gravel.

4. Existing development in the area must be compatible with the potential refuse disposal site, or the possibility for suitable screening from public view must exist.

5. The preservation of water resources, natural resources, and natural features must be given full consideration.

A total of 32 potential sites was investigated. Investigations included on-site inspection and review by the Soil Conservation Service and the Regional Planning Agency Staff. Fourteen sites were eliminated. The 18 remaining are generally suitable for refuse disposal sites and are shown by general locations on Figure 10. Table 11 describes each site, giving its assets and limitations.

The availability and general location of sites as shown on Figure 10 have been used in the over-all development of the three alternate plans. These are not, however, to be considered as final site selections, since more detailed study of each would be required.

In making the final refuse disposal site selection, we recommend that the site evaluation consist of the following investigations to be carried out by qualified engineers:

1. Determination of the available fill volume as related to the projected future capacity needs stated in this report.

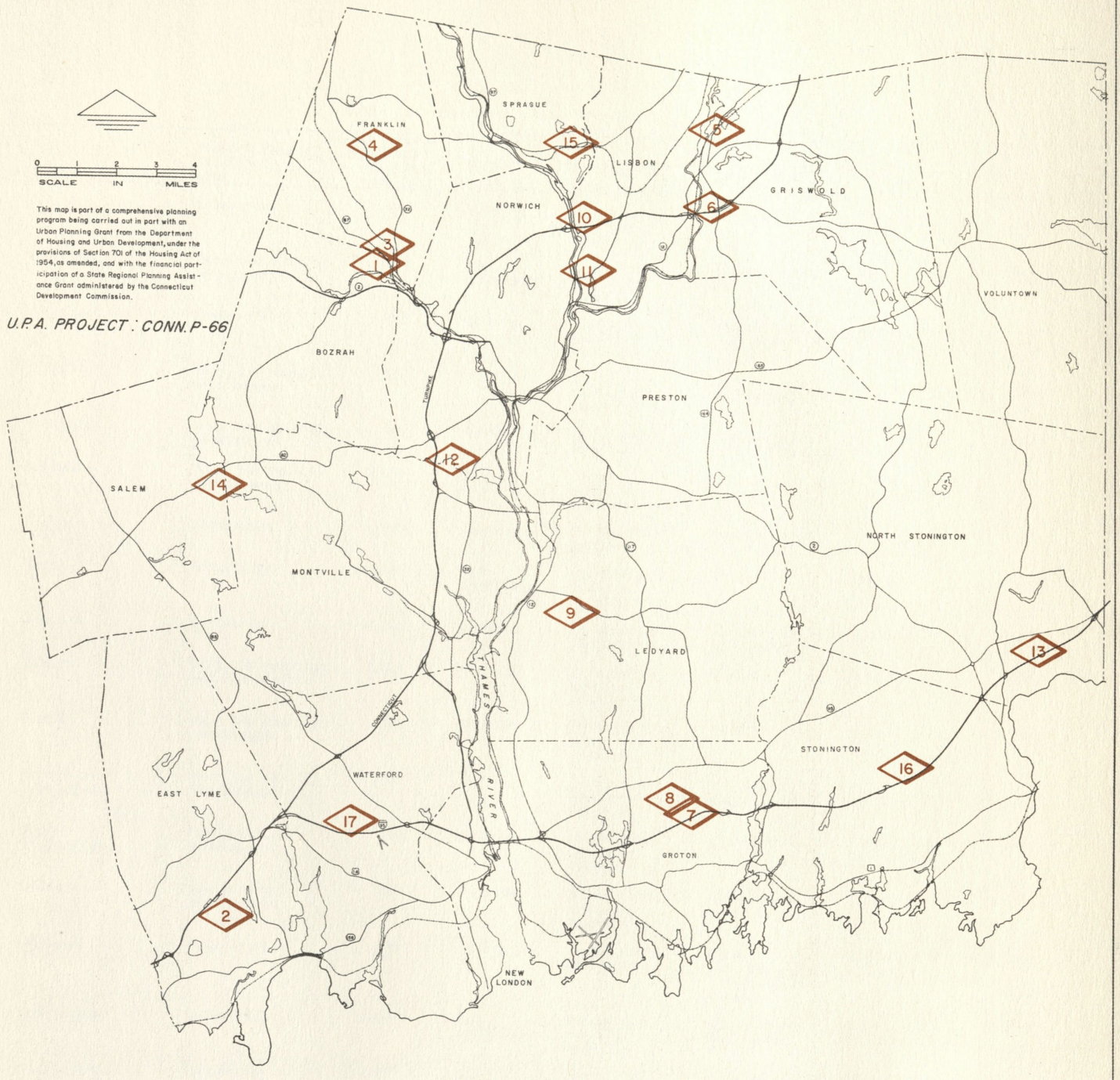
2. Evaluation of site location with respect to hauling costs, in total and in comparison with alternative sites.

3. Consideration of local traffic circulation.

4. Evaluation of site with respect to its possible effect on the neighborhood, including visibility, dust, traffic, fires, smoke, disease carriers, blowing trash, etc.

5. Determination of the availability of cover material in sufficient quantities on the site. If on-site cover material is not available, determine what sources are available and at what cost.

SOUTHEASTERN CONNECTICUT REGION



LEGEND

0 Potential Refuse Disposal Site

Note: Number refers to text, Table II

POTENTIAL REFUSE DISPOSAL SITES

FIGURE 10

PREPARED BY METCALF & EDDY ENGINEERS • PLANNERS
BOSTON • NEW YORK • PALO ALTO • SAN FRANCISCO
NOVEMBER, 1967

Table 11. Potential Refuse Disposal Sites

Site number and town	Planned future land use area	Estimated minimum capacity, acre-feet	General site characteristics				
			Cover material	Surface and groundwater	Existing land use	Site preparation	Accessibility
1. Bozrah	Industrial	400	On-site	Protection measures required	Agricultural	Normal plus screening	Good
2. East Lyme	Very low density development	800	Not available	Protection measures required	Woodland	Normal plus clearance	Good
3. Franklin	Industrial	400	On-site	Protection measures required	Agricultural and gravel pit	Normal plus screening	Good
4. Franklin	Very low density development	500	On-site	Protection measures required	Agricultural and vacant	Normal	Good
5. Griswold	Very low density development	900	On-site	No apparent problem	Agricultural and residential	Normal plus screening	Good
6. Griswold	Very low density development	2,600	On-site	Protection measures required		Normal plus screening	Fair
7. Groton	Industrial	1,500	On-site	No apparent problem	Agricultural	Normal plus screening	Good
8. Groton*	Industrial	2,000	Not available	Protection measures required	Vacant	Normal	Good
9. Ledyard	Industrial	4,000	On-site	No apparent problem	Gravel pit and vacant	Normal	Good
10. Lisbon	Very low density and low density	3,000	On-site	Protection measures required	Vacant	Normal	Fair
11. Lisbon	Very low density development	300	On-site	Protection measures required	Vacant	Normal plus slopes stabilization	Good
12. Montville - Norwich	Very low density development	2,500	On-site	Protection measures required	Gravel pit partly active	Normal plus screening	Fair
13. North Stonington	Low density development	900	On-site	Protection measures required	Gravel pit, vacant	Normal plus screening	Fair
14. Salem	Low density development	600	On-site	Protection measures required	Abandoned airport	Normal	Good
15. Sprague	Industrial	600	On-site	No apparent problem	Refuse disposal, industrial, vacant	Normal plus slopes	Good
16. Stonington	Industrial	1,000	Not available	Protection measures required	Agricultural and vacant	Normal plus clearing	Fair
17. Waterford	Industrial	1,200	Not available	Protection measures required	Industrial and vacant	Normal plus clearing	Good

* This site was recently purchased by Groton for future use as a landfill.

Source: Evaluations by Metcalf & Eddy

6. Evaluation of potential groundwater pollution and determination of the steps required to protect against such pollution.

7. Consideration of any possible surface drainage problems caused by the filling.

8. Determination of site preparation costs, including development of access roads, buffering, water service, land clearance, diking, site security, etc.

9. Inspection and approval of the site and the plan for its development and operation by the Connecticut State Department of Health.

ALTERNATIVE PLANS FOR ORDINARY REFUSE DISPOSAL

Three possible alternative plans have been studied with respect to future general refuse disposal systems for Southeastern Connecticut. These alternative plans, identifiable on the basis of service areas, are designated as follows:

1. Total Regional Plan.

2. Subregional Plan.

3. Individual Municipal Plan.

Each alternative plan has been studied with respect to present problems, existing and ultimate disposal methods, potential sites, organization, general cost estimates and feasibility of implementation. While numerous choices exist within the various alternatives, only those choices which deserve serious consideration and discussion are presented.

The three alternative plans refer to general refuse problems, and where special conditions exist these are handled separately regardless of the alternative plan.

Alternative Plan No. 1. Alternative Plan No. 1, the Total Regional Plan, contemplates the service of the entire Southeastern Connecticut Region under the control of a single solid waste disposal authority. The disposal method would be by one central incineration plant. Collection would be either by direct haul in ordinary packer-type collection vehicles or by the use of transfer stations where greater quantities of refuse may be loaded into a single vehicle for long-distance hauls. The disposal area would be located as near as possible to one of the two centers of population, that is, either in the urban areas of Norwich or Groton-New London. If selected, this approach to the regional problems must begin immediately. The timing is best now, as 8 of 17 towns must solve refuse disposal problems by 1970.

The total land requirements for the incinerator plant and residue disposal are estimated to be 450 acres. The design capacity of the incinerator for the year 1995 is 1,300 tons per 24-hour day.

A minimum of six transfer stations serving the towns beyond economical collection vehicle hauling distance are contemplated, with a combined estimated capacity of 1,050 tons per 24-hour day. Hauling capabilities must range between 6.4 billion ton-miles in 1970 to 28.9 billion ton-miles in 1990. The total annual costs* for such a system are estimated to be as follows: 1970, $2.4 million; 1980, $3.3 million; and 1990, $4.5 million. The average annual cost over the 20-year period 1970-1990 is estimated to be approximately $3.4 million. This represents an average total cost of $14.80 per ton.

A breakdown of the above costs is given in Table 12. Assumed unit costs are given in Appendix B.

Alternative Plan No. 1 - Advantages. The following are the principal advantages to the Southeastern Connecticut Region for Alternative Plan No. 1:**

1. For specific elements of the refuse disposal system lower total per unit cost annually, with respect to all other alternative plans because of the single large disposal unit and some combined collection operations.

2. Better over-all operating efficiency because only one disposal facility would be involved.

3. The elimination of local disposal facilities will certainly be received favorably by many communities, especially the small municipalities.

4. The control resting with a single authority is certainly more desirable, although this may also be accomplished under other alternative plans.

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* Total annual costs include all capital costs allocated on an annual basis over the lifetime of the particular capital improvement, and estimated annual operating costs. In all cases, 1967 dollar value is used. Disposal, local collection, and transfer collection costs are included.

** Here, as in the case of all the alternative plans, the advantages and disadvantages are relative with respect to the other alternative plans. They are presented, therefore, as comparisons to the alternative plans.

Table 12. Comparative Costs of Alternative Refuse Systems

Alternative plan	Item	Total annual costs ($ Million) 1970	1980	1990	Average annual cost 1970-1990 Total average annual cost ($ Million)	Average cost per ton (Dollars)
No. 1 Regional	Disposal	$0.7	$1.0	$1.4	$1.0	$ 4.35
	Local collection	1.5	1.9	2.8	2.1	9.15
	Transfer and haul	0.2	0.4	0.5	0.3	1.30
	Total	$2.4	$3.3	$4.7	$3.4	$14.80
No. 2-A Subregional with central incineration only	Disposal	$0.8	$1.1	$1.6	$1.1	$ 4.80
	Local collection	1.2	1.5	2.1	1.6	6.95
	Transfer and haul	0.2	0.2	0.3	0.2	1.30
	Total	$2.2	$2.8	$4.0	$2.9	$13.05
No. 2-B Subregional with central incineration and subregional sanitary landfill	Disposal	$0.5	$0.8	$1.2	$0.8	$ 3.60
	Local collection	1.3	1.8	2.6	1.9	8.20
	Transfer and haul	-	-	-	-	-
	Total	$1.8	$2.6	$3.8	$2.7	$11.80
No. 3 Municipal plan	Disposal	$0.6	$0.9	$1.2	$0.9	$ 3.80
	Local collection	1.2	1.7	2.6	1.9	8.05
	Transfer and haul	-	-	-	-	-
	Total	$1.8	$2.6	$3.8	$2.8	$11.85

Source: Estimates by Metcalf & Eddy

Alternative Plan No. 1 - Disadvantages. Disadvantages to the Southeastern Connecticut Region of a total regional system are:

1. Either a single tract of land containing 5,400 acre-feet of capacity or approximately 450 acres of land, or several separate sites of lesser area, would be required. Such a sizeable tract of land would be extremely difficult to acquire, especially in a location within reasonable proximity to the sources of refuse. The use of several sites would increase the over-all cost of operation.

2. Although local disposal facilities are eliminated, the local (or group) transfer stations must be operated and maintained. The potential nuisance is almost as severe as for a disposal operation.

3. Long-distance transportation of bulky refuse in the collecting vehicle (usually an open truck) is neither aesthetically nor economically desirable. Accordingly, it would be desirable to install size reduction equipment in the several transfer stations to enable transport of processed bulky refuse in the same larger vehicle as would be used for ordinary refuse. The additional costs of these several size-reduction facilities are not included in the cost data heretofore.

4. Expansion for growth beyond 1990 would be difficult and expensive.

5. Of all the alternative plans, this is the most expensive in total annual cost.

Alternative No. 2 - Subregional Refuse Systems. The subregional approach involved the investigation of a wide range of possibilities. Alternatives and combinations are numerous. To assist in understanding and devising a reasonable alternative plan for subregional systems, the following general guidelines were used:

1. For a given disposal method, the facility with the greater capacity usually can be operated at a lower per ton cost, including proper allocation of capital costs.

2. The use of transfer stations and tractor-trailer hauls is more economical than direct packer hauling when hauling distances exceed the following limits:

   Low density area - 15 miles round trip.

   Medium and high density areas - 5 miles round trip.

3. Transfer stations should have a minimum capacity of 20 tons per day, with 40 tons per day more desirable.

4. Regional facilities should be located as close as possible to the regional centers of population.

5. The timing for establishing the regional facility should correspond to the timing of need in the major population centers.

Two types of subregional approaches generally are representative of the numerous alternatives and combinations. These have been designated as follows:

Alternative No. 2-A - Subregional Refuse Systems with Central Incineration Disposal Only.

Alternative No. 2-B - Subregional Refuse Systems with Central Incineration and Subregional Sanitary Landfills.

Alternative No. 2-A - Subregional Refuse Systems with Central Incineration Only. This alternative plan contemplates three central incinerators serving as the only disposal facilities in the entire region. The service area of each incinerator is based on the distance of various groupings of population without regard for town boundaries. This is important in terms of design capacity of the central incinerators as well as the collection system serving the region. Because of the disregard for town boundaries, the organization required would have to be a regional refuse authority.

The disposal method would be incineration and landfill. The three central incinerators would generally be located in or as near as possible to the major centers of population, namely, Groton, Norwich, and New London-Waterford. The collection system contemplates the use of transfer stations scattered through the region to serve significant clusters of population and development. By choosing these locations prudently, local collection costs can be kept reasonable. In addition, because of the operation of the entire refuse system under one authority, it would be possible to serve the various transfer stations with only the required number of transfer vehicles and crews necessary to serve the entire region. This arrangement requires a total of 26 transfer stations with a total combined capacity of 900 tons per day. Some stations would require a removal of the refuse received only once per week. Based on our estimates of refuse volumes, the entire system of transfer stations could be served by five tractor-trailer haulers in 1990. Hauling capabilities are estimated to range between 5.7 billion ton-miles in 1970 to 13.3 billion ton-miles in 1990.

The land requirements for both the plant and its residue

disposal and the capacities for the three central incinerators are as follows:

1. Waterford-New London Incinerator - 180 acres, 450 tons per 24-hour day.

2. Norwich Incinerator - 200 acres, 450 tons per day.

3. Groton Incinerator - 310 acres, 580 tons per day.

The total annual costs for this alternative plan are estimated to be as follows: 1970, $2.1 million; 1980, $2.8 million; and 1990, $4.0 million. The average annual cost over the 20-year period 1970-1990 is estimated to be approximately $2.9 million. This represents an average total cost of $13.05 per ton.

A breakdown of the above costs is shown in Table 12.

Alternative Plan No. 2-A - Advantages. The principal advantages to the Southeastern Connecticut Region of Alternative Plan No. 2-A are:

1. Only three disposal units, all incinerators, are contemplated under this plan. Therefore, there is less land area required than for Alternatives 2-B and 3.

2. The larger facilities for disposal by incineration and landfill will result in a lower per ton cost for disposal than would pertain with the same method but with the smaller facilities of Plan 3.

3. This plan would appropriately serve the ultimate future land use plan for the Southeastern Connecticut Region.

4. The required transfer hauling is considerably less in ton-miles, and therefore in cost, than under the total regional plan; although it is still a significant factor in the economic total.

Alternative Plan No. 2-A - Disadvantages. The principal disadvantages of this alternative plan are:

1. The plan of three central incinerators favors the large centers of population financially but not the smaller towns. This is true because the sanitary landfill disposal method on a subregional basis is much less expensive to the smaller more rural towns.

2. Plan implementation will be hindered where participation in a particular regional facility is required of a town without an immediate problem.

3. The large number of transfer stations (26) could

become difficult to manage.

4. Transfer station collection service only once per week, as would be required at 12 transfer stations, would result in the storage of refuse for this weekly period. This could potentially become a health problem.

Alternative Plan No. 2-B - Subregional Refuse Systems with Central Incineration and Subregional Sanitary Landfills. This alternative to the subregional plan emphasizes the use of subregional sanitary landfills for small towns where suitable sites can be found. Three central incinerators are still contemplated. Regional participation would be limited as affected by distance and availability of suitable sanitary landfill sites in the adjacent towns.

There are no transfer stations contemplated under this plan. The only collection would be by local packer hauling directly between the household and disposal facility.

Subregional facilities would be organized individually, that is, each group of towns using a particular regional facility would make its own arrangements.

The plan is flexible in design in that the existing suitable facilities may be operated until such time as they are used up. At that time, subregional facilities are planned to accept these additions.

The following additional land requirements and capacities are necessary under this alternative plan:

1. One subregional incinerator - design capacity of 180 tons per 24-hour day; land requirements approximately 60 acres.

2. Four subregional sanitary landfills - combined volume 6,500 acre-feet; combined land area approximately 550 acres.

3. Five local sanitary landfills - combined volume 3,215 acre-feet; combined land area 270 acres.

4. Two local incinerators - combined design capacity of 475 tons per 24-hour day.

The range of total annual costs for such a system are estimated to be as follows: 1970, $1.8 million; 1980, $2.6 million; and 1990, $3.8 million. The average annual cost over the 20-year period 1970-1990 is estimated to be approximately $2.7 million. This represents an average cost per ton of $11.80.

A breakdown of the above costs is shown in Table 12.

Alternative Plan No. 2-B - Advantages. The following are the principal advantages to the Southeastern Connecticut Region for this alternative plan:

1. This plan is most advantageous to the small towns where the use of subregional sanitary landfills would result in lower costs of disposal than would be realized with incinerators.

2. The groupings of towns served for each subregional facility are politically more acceptable than with the other regional alternatives.

3. Transfer stations and long-distance haul costs are eliminated under this plan.

4. The land utilized is generally in the more rural areas where land values are lower and land use conflicts are less objectionable.

5. This plan can more easily evolve beyond the planning period than can a fuller regional system dependent upon the incineration disposal method only.

6. This plan along with Alternative Plan 3 is the least expensive.

Alternative Plan No. 2-B - Disadvantages. Disadvantages to the Southeastern Connecticut Region of this alternative plan are:

1. A total of five groupings of municipalities is contemplated. It may be more difficult to organize all of these groupings than to form one regional authority.

2. The absence of ideally suitable sites, particularly in Stonington and Montville, may require variations from this plan.

3. Although an attempt was made to avoid it, in certain towns the local collection costs per ton are higher under this plan.

4. Incineration is used to a lesser extent, requiring the ultimate use of more land for refuse disposal rather than some more beneficial service.

Alternative Plan No. 3 - Municipal Plan. This alternative plan is based on the responsibility for refuse disposal service remaining with each individual municipality. The disposal sites and methods will vary, depending on the local situation. Collection will be accomplished locally, with direct haul between pickup points and disposal sites. The timing of development of this plan would depend on local need.

Alternative Plan No. 2-B - Disadvantages. Disadvantages to the Southeastern Connecticut Region of this alternative plan are:

1. A total of five groupings of municipalities is contemplated. It may be more difficult to organize all of these groupings than to form one regional authority.

2. The absence of ideally suitable sites, particularly in Stonington and Montville, may require variations from this plan.

3. Although an attempt was made to avoid it, in certain towns the local collection costs per ton are higher under this plan.

4. Incineration is used to a lesser extent, requiring the ultimate use of more land for refuse disposal rather than some more beneficial service.

The municipal plan would result ultimately in four incinerators - Groton, New London, Norwich, and Waterford. All other municipalities would, within the planning period, utilize the sanitary landfill method of refuse disposal. The total annual costs of collection and disposal for this alternative plan are estimated to be as follows: 1970, $1.8 million; 1980, $2.6 million; and 1990, $3.8 million. The average annual cost per year over the 20 years 1970-1990 is estimated to be $2.8 million. This corresponds to an average per ton cost of $11.85.

A breakdown of these estimated costs is indicated in Table 12.

The total additional land requirements and incinerator and landfill capacities,* over what exists today which is acceptable for continued use, are as follows:

1. Four incinerators - 575 tons per 24-hour day - 190 acres.

2. Thirteen sanitary landfills - 675 acres of land (8,100 acre-feet).

Alternative Plan No. 3 - Advantages. The following are the principal advantages to the Southeastern Connecticut Region of this alternative plan:

1. Intermunicipal cooperation, which is often difficult to achieve, is not required.

2. Greater flexibility exists, with each town being able to accept unpredicted development trends without affecting a regional agreement.

3. This plan along with Alternative Plan No. 2-B is the least expensive.

Alternative Plan No. 3 - Disadvantages. Disadvantages to the Southeastern Connecticut Region of this alternative plan are:

1. In several individual cases, there are definite problems in finding local disposal sites. This is particularly true in Stonington and Montville and long-range problems could occur in New London.

2. The utilization of smaller disposal facilities results in a higher per unit cost than for larger regional facilities.

3. A greater percentage of refuse is disposed of by sanitary landfill, thus, requiring a greater total area of land which ultimately could be put to better use.

* Cumulative capacities through 1990.

4. Economics of location cannot be achieved to the fullest extent.

COMPARISONS OF ALTERNATIVE DISPOSAL PLANS

Cost Comparisons. Table 12 shows the detailed cost comparisons for the various alternative plans. The total annual costs for 1970, 1980, and 1990 are presented as well as the average annual cost over the 20-year period 1970-1990. These comparisons are shown graphically on Figure 11.

Assumed unit costs are indicated in Appendix B.

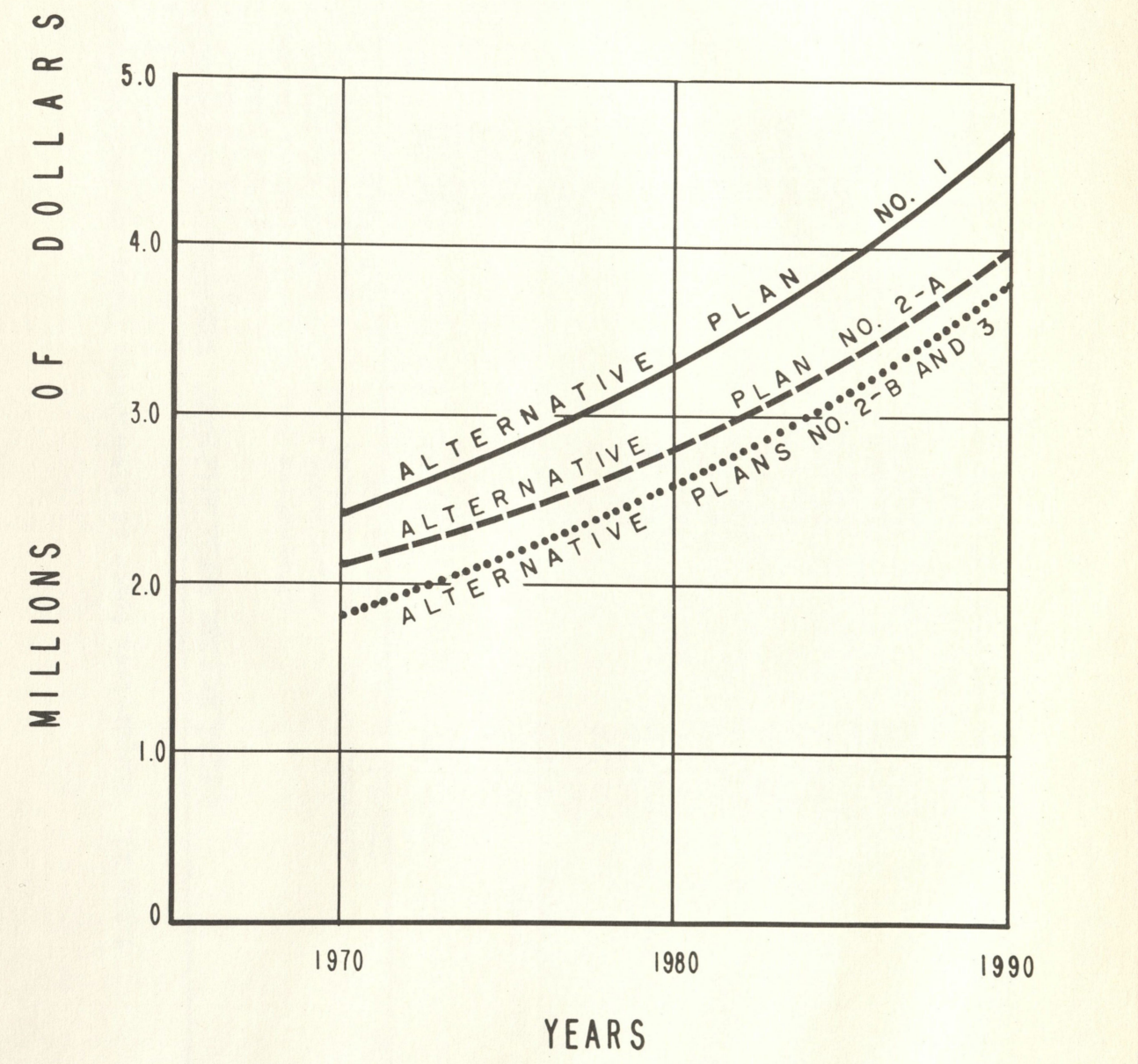
With respect to average annual costs, Alternative Plan 2-B, the subregional systems with central incineration and subregional sanitary landfills is the most favorable. However, there is not extensive difference between this plan and Alternative Plan 3. One difference lies in the area of collection. Local collection costs under the individual municipal plan are lower in the earlier years, but they are more closely aligned to the local collection costs of the subregional plan without transfer stations in later years. This is principally because subregional facilities have been selected on the basis of the future plan of development and the logical groupings of population centers. With respect to disposal, the subregional plan is more favorable because of larger facilities operating at lower per ton costs.

Table 13 reports the average cost effect upon each individual municipality. Under Alternative Plans No. 1 and 2-A, the cost to each municipality is based on its participation according to its total refuse tonnage applied to the average per ton cost for operating the entire system. This type of arrangement is compatible with the planned regional refuse authority contemplated as part of these plans.

As is evident from Table 13, there is no one plan which offers the best cost advantage to all individual towns. Also, there is no one plan which is the most expensive for all municipalities. It is not imperative, however, that the selected plan necessarily be the least expensive. However, it is most desirable that a regional plan be less expensive, or of equal expense to, the cost of a local refuse system (Alternative Plan 3).

Alternative Plan 2-B is less expensive than, or of equal expense to, Alternative Plan 3 in 17 of the 18 municipalities (including Jewett City). Alternative Plans 1 and 2-A are less expensive than, or of equal expense to, Alternative Plan 3 in 9 and 10 of the 18 municipalities, respectively..

It appears, therefore, that on a cost basis alone, Alternative Plan 2-B, the subregional plan without transfer-hauling, or



SOUTHEASTERN CONNECTICUT REGIONAL PLANNING AGENCY

This chart is part of a comprehensive planning program being carried out in part with an Urban Planning Grant from the Department of Housing and Urban Development, under the provisions of Section 701 of the Housing Act of 1954, as amended, and with the financial participation of a State Regional Planning Assistance Grant administered by the Connecticut Development Commission.

COMPARATIVE COSTS OF ALTERNATIVE REFUSE COLLECTION AND DISPOSAL SYSTEMS

Metcalf & Eddy Engineers & Planners Boston New York Palo Alto San Francisco

FIGURE II

NOVEMBER , 1967

Table 13. Comparative Costs of Alternative Plans, by Municipality

Municipality	Annual average cost, 1970-1990, combined refuse collection and disposal			
	Alternative 1, regional plan	Alternative 2-A, subregional plan with central incineration	Alternative 2-B, subregional plan with central incineration and subregional sanitary landfills	Alternative 3, municipal plan
Bozrah	$ 32,700	$ 28,600	$ 40,000	$ 43,200
East Lyme	184,600	161,200	161,800	161,800
Franklin	14,000	12,200	17,000	22,900
Griswold - Jewett City	66,200	57,800	36,800	38,600
Rest of Town	28,100	24,600	30,200	37,100
Groton	848,100	740,700	619,100	619,100
Ledyard	201,400	175,900	195,000	195,400
Lisbon	26,200	22,900	30,200	35,600
Montville	304,700	266,100	197,100	197,100
New London	376,600	328,900	259,900	222,200
North Stonington	51,500	44,900	54,400	58,700
Norwich	628,900	549,200	475,800	475,800
Preston	50,300	43,900	54,400	58,600
Salem	33,900	29,600	42,000	42,000
Sprague	76,800	67,100	44,600	44,600
Stonington	299,100	261,200	168,500	169,500
Voluntown	13,500	11,800	21,600	21,600
Waterford	217,800	190,200	197,500	208,200

Source: Estimates by Metcalf & Eddy

Table 13. Comparative Costs of Alternative Plans, by Municipality

Annual average costs, 1970-1990, combined regional collection and disposal

Municipality	Alternative 1, with central disposal	Alternative 2-A, subregional plan with central disposal	Alternative 2-B, subregional plan with central disposal	Alternative 3, municipal plan
Boonah Town	$ 25,700	$ 29,500	$ 29,500	$ 43,900
Beaudesert	181,600	181,600	181,600	181,600
Birnam	12,200	12,200	12,200	12,200
Canungra	38,800	38,800	38,800	38,800
Crows Nest	52,400	52,400	52,400	52,400
Esk	45,700	45,700	45,700	45,700
Gatton	82,600	82,600	82,600	82,600
Ipswich	1,210,000	1,210,000	1,210,000	1,210,000
Kilcoy	45,700	45,700	45,700	45,700
Laidley	52,400	52,400	52,400	52,400
Lowood	38,800	38,800	38,800	38,800
Marburg	25,700	25,700	25,700	25,700
Minden	12,200	12,200	12,200	12,200
Moreton Shire	82,600	82,600	82,600	82,600
Mount Crosby	12,200	12,200	12,200	12,200
Pine Rivers	181,600	181,600	181,600	181,600
Redbank	181,600	181,600	181,600	181,600
Rosewood	25,700	25,700	25,700	25,700
Stanley	82,600	82,600	82,600	82,600
Toowoomba	1,210,000	1,210,000	1,210,000	1,210,000
Warwick	181,600	181,600	181,600	181,600
Wynnum	181,600	181,600	181,600	181,600
Yeerongpilly	82,600	82,600	82,600	82,600
Total	$ 4,273,500	$ 4,277,300	$ 4,277,300	$ 4,391,700

Source: Determined by Wilbur Smith & Assoc.

Alternative Plan 3, the individual municipal plan, is the most desirable.

Site Comparisons. All alternative plans are developed with an awareness of the difficulty of finding suitable sites of sufficient capacity. For this reason, in some cases, a more expensive plan may be justified.

Three major problems were encountered with sites. These are (1) number of physically suitable sites, (2) capacities of sites, and (3) locations of sites with respect to land use and accessibility.

The number of physically suitable sites was small, and limited the reasonable choices under the alternative plans. Most importantly, this has worked to the detriment of Stonington, Montville, and New London.

The limited capacities of suitable sites requires smaller service areas and, to a certain extent, limits the possibilities of taking advantage of regional facilities. This problem is most evident in Alternative Plans 1 and 2-A.

Site location, particularly with respect to future development, has influenced the alternative plans. This is particularly evident where regional sanitary landfills would be desirable, but suitable sites cannot be found with acceptable accessibility from the towns served.

Disposal Methods and Costs. The disposal of all refuse by incineration contemplated under Alternative No. 1 and Alternative Plan 2-A requires less total land and poses less of a potential health hazard. Conversely, because of the utilization of regional sanitary landfills, the most economical per unit costs for disposal are found under Alternative Plan 2-B.

Transfer Stations. The use of transfer stations was included under two of the alternative plans discussed. This is because, to accomplish these plans, their use is the most economical and logical method. However, in Southeastern Connecticut the existing land use and the regional development plan are such that the overall land use pattern that can be expected will consist of many small communities of low density development which are unable to support economically local transfer stations. In addition, the rural nature of these towns, plus the extensive tracts of open spaces separating population centers, would substantially increase the cost of local collection hauls to regional transfer stations. Therefore, the use of transfer stations in any regional refuse disposal system is not warranted.

Timing. Alternative Plan 2-B and Alternative Plan 3 are best suited to meet the required timing of the needed solutions to individual problems.

Small Towns. Alternative Plan 2-B favors the small towns because of the use of subregional sanitary landfills as well as central incinerators.

Central Cities. Alternative Plan 2-A favors the central cities because of the use of central incinerators with greater capacities and therefore smaller unit costs for disposal. Although not a definite financial advantage to the central cities, Alternative Plan 2-B does not become, in most cases, less economical to them than the individual municipal plan.

ALTERNATIVE APPROACHES TO SPECIAL REFUSE PROBLEMS

As in the case of general refuse, the disposal of bulky wastes could be achieved either on a total regional basis, a subregional basis or a local basis. In evaluating this problem, it must be recognized that no operations in the region now accomplish bulky wastes disposal in a completely acceptable manner. Extensive steps, beyond present procedures, are required.

Bulky wastes amount to a relatively small portion of the total refuse quantity. Thus, proper disposal on an individual town basis would become expensive, especially for the small towns. If disposal of junk automobiles is considered as part of the bulky refuse problem, the individual approach is out of the question for most towns in the region.

The subregional and regional approach to bulky wastes provide the necessary economic climate for operation of shredding equipment. Our projections of bulky wastes quantities show that by 1990, approximately 170 tons of bulky wastes, including junk autos, per 24 hour day, 260 days per year, will be generated from all the municipalities in Southeastern Connecticut. The total amount expected in that year is about the minimum required to keep a major shredder, capable of processing automobiles (20 tons per hour) operating for 8 hours per day.

The use of subregional shredders would have the advantage of shorter hauling of these bulky wastes. But there would be the disadvantage of a significant over-sizing, probably in excess of the equipment, assuming automobile shredding equipment is installed. On the other hand, a total regional facility would be able to operate closer to its design capacity and thus have a greater efficiency than subregional units. However, the transportation costs would become significantly higher.

More data must be developed to compare these considerations. Appropriate recommendations are made in a later paragraph.

The other special problem, that of fly-ash disposal, is an industrial problem of a local nature. While it is the respon-

sibility of government to require the healthful and sanitary disposal of fly ash, the responsibility for its actual disposal should rest with the industry producing the problem and anyone else involved with its handling from its original production to its final disposal.

Our recommendation is that fly-ash disposal be controlled as a normal sanitary landfill operation and that individual municipalities protect their water resources through the control of all private disposal, including fly ash disposal. To be effective, existing controls must be strictly enforced by the individual municipalities through the appropriate state authorities.

The revised Connecticut Public Health Code, Section 19-13-B24a, as set forth in Appendix A, requires that all new sites for refuse disposal and its proposed operation shall be approved by the State Department of Health prior to the start of operation. In addition, the code prohibits the operation of any existing refuse disposal facility which contributes in any manner to the pollution or contamination of ground or surface waters. Thus the people in Southeastern Connecticut have the tools available for preventing pollution and contamination problems from refuse disposal facilities including fly-ash disposal facilities, if they choose to use them.

RECOMMENDATIONS

RECOMMENDED REFUSE DISPOSAL PLAN

The discussions above indicate that the total regional refuse system and the major subregional system with transfer stations do not satisfactorily meet the short- and long-range needs of Southeastern Connecticut. The individual municipal plan does not take advantage of larger disposal facilities with their lower unit cost for operation.

We, therefore, recommend that Alternative Plan 2-B, the subregional plan with central incineration and subregional sanitary landfill, be adopted by the Southeastern Connecticut Regional Planning Agency.

Table 14 presents the recommended refuse disposal plan for Southeastern Connecticut by individual disposal facilities. This presentation shows the recommended staged development program and the estimated capital costs for carrying out each stage. The details of the plan, including service areas, served population, disposal method, design capacity, estimated annual average refuse quantities, the estimated annual average cost per ton for the disposal facility, and the possible sites, are set forth below. Also

Table 14. Staged Development Program - Recommended Southeastern Connecticut Refuse Disposal Plan

Subregional grouping	Stage I - To be completed by 1970 Disposal method - action required	Stage II - To be completed by 1980 Disposal method - action required	Stage III - To be completed by 1990 Disposal method - action required	Estimated capital outlay ($Million) Stage I	Stage II	Stage III	Total
Bozrah-Franklin	Sanitary landfill, serving Bozrah and Franklin; purchase 330 acre-feet; supply necessary equipment and garage facilities; abandon present Bozrah site	Sanitary landfill - continue same operation	Sanitary landfill - continue same operation	0.07	-	-	0.07
Lisbon-Griswold-Jewett City	Sanitary landfill, serving Lisbon, Griswold and Jewett City; purchase 725 acre-feet; supply necessary equipment and garage facilities; abandon present Lisbon and Jewett City sites	Sanitary landfill - continue same operation	Sanitary landfill - continue same operation	0.15	-	-	0.15
Ledyard-Preston	Sanitary landfill, serving Ledyard and Preston; use existing Ledyard site; supply necessary equipment and garage facilities; abandon present Preston site	Sanitary landfill - continue same operation	Sanitary landfill - purchase 3,600 acre-feet; abandon present site	-	-	0.90	0.90
Stonington-North Stonington	Sanitary landfill, serving Stonington and North Stonington; purchase 2,450 acre-feet; supply necessary equipment and garage facilities; abandon present North Stonington and Stonington sites	Sanitary landfill - continue same operation	Sanitary landfill - continue same operation	0.54	-	-	0.54
New London-Waterford	Sanitary landfill in Waterford, serving Waterford only; incineration in New London serving New London only; purchase 775 acre-feet sufficient for Waterford sanitary landfill through 1975 and for New London-Waterford incinerator residue 1976-1995. Supply necessary equipment and garage facilities; abandon present Waterford site	Incineration and landfill serving New London and Waterford. Construct 180 ton per day incinerator expandable to serve East Lyme beyond 1990. Consider possible incorporation of shredder	Incineration and landfill - continue same operation	0.21	1.11	-	1.32
East Lyme	Sanitary landfill; purchase 800 acre-feet; extend existing disposal operation to new site as needed	Sanitary landfill - continue same operation	Sanitary landfill - continue same operation	0.08	-	-	0.08
Groton	Sanitary landfill, continue present operation; purchase 1,460 acre-feet for future land needs, adjacent land area is recommended	Incineration and landfill; construct 225 ton per day incinerator	Incineration and landfill - continue same operation	0.38	1.13	-	1.51
Montville	Sanitary landfill, purchase 2,100 acre-feet; supply necessary equipment and garage; abandon present operation	Sanitary landfill - continue same operation	Sanitary landfill - continue same operation	0.45	-	-	0.45
Norwich	Incineration and landfill, purchase 1,485 acre-feet; supply necessary equipment; abandon Corning Road; construct 250 ton per day incinerator	Incineration and landfill - continue same operation	Incineration and landfill - continue same operation	1.75	-	-	1.75
Salem	Sanitary landfill, convert present operation and continue to operate	Sanitary landfill - purchase 315 acre-feet; supply necessary equipment and garage facilities; abandon present site	Sanitary landfill - continue same operation	-	0.03	-	0.03
Sprague	Sanitary landfill, continue present operation	Sanitary landfill - continue present operation	Sanitary landfill - continue same operation	-	-	-	-
Voluntown	Sanitary landfill, convert present operation and continue its use	Sanitary landfill - continue same operation	Sanitary landfill - continue same operation	-	-	-	-
Total Region	Shredding, incineration, salvage and landfill - investigation of alternatives of providing a regional shredder for bulky wastes including junk autos	Shredding, incineration, salvage and landfill; construct regional shredder, design capacity 200 tons per day	Shredding, incineration, salvage, landfill - continue same operation	0.02	0.60	-	0.62
			Total Costs	3.65	2.87	0.90	7.42

NOTE: See Fig. 12 for alternative locations of proposed sites.

included is a discussion of each town and the effect of the recommended plan on that town. Figure 12 is the recommended refuse disposal plan for Southeastern Connecticut.

Subregional Refuse Disposal Facilities. The following subregional refuse disposal facilities are recommended as part of the long-range refuse disposal plan for Southeastern Connecticut.

1. Bozrah-Franklin Subregional Disposal Facility

   Service area: Towns of Bozrah and Franklin

   Estimated 1990 served population: 8,800 persons

   Date of Implementation: Immediately (1970)

   Disposal method: Sanitary Landfill

   Design capacity: 330 acre-feet

   Estimated annual average refuse quantity 1970-1990: 3,100 tons

   Estimated average disposal cost per ton, 1970-1990: $3.80

   Estimated annual average disposal cost per capita, 1970-1990: $2.14

   Possible sites: No. 1, No. 3, No. 4

   Both Bozrah and Franklin are rural towns which are not planned for much suburbanization over the next 20 to 25 years. Because their combined 1990 population is estimated to be only 8,800 persons, because land values are relatively low, and because suitable sites exist, a subregional sanitary landfill is recommended. Although Bozrah's existing disposal facility has the available capacity, the site is not suitable physically for conversion to a sanitary landfill operation, and it is not conveniently located for use as a subregional facility. Franklin's refuse is presently disposed of outside the region, not by any specific agreement between towns but by permission of the other town to the local collectors in Franklin. It is, therefore, logical for these two towns to be combined immediately to the benefit of both communities.

2. Lisbon-Griswold-Jewett City Subregional Disposal Facility

   Service area: Towns of Lisbon and Griswold, including Borough of Jewett City.

Included is a discussion of each town and the effect of the recommended plan on that town. Figure 12 is the recommended refuse disposal plan for Southeastern Connecticut.

Subregional Refuse Disposal Facilities. The following subregional refuse disposal facilities are recommended as part of the long-range refuse disposal plan for Southeastern Connecticut:

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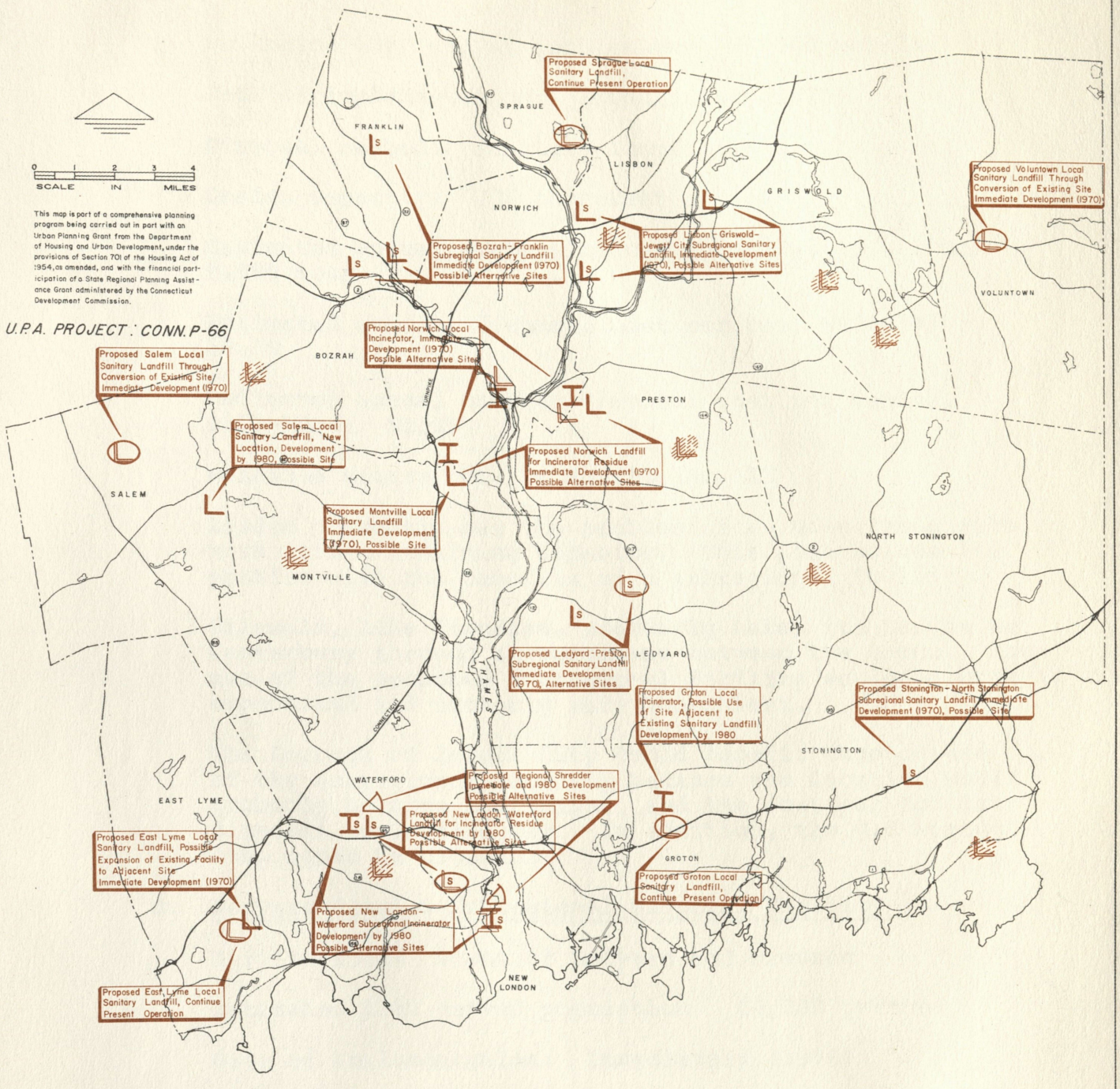
SOUTHEASTERN CONNECTICUT REGION



EXISTING FACILITIES

- Incinerator
- Landfill

PROPOSED FACILITIES

- Incinerator *
- Sanitary Landfill *
- Regional Shredder

* Note: S = Subregional facility
All Locations Generalized

- Proposed Use of Existing Site for Sanitary Landfill
- Recommended Abandonment of Existing Facility

RECOMMENDED REFUSE DISPOSAL PLAN

FIGURE 12

PREPARED BY METCALF & EDDY ENGINEERS • PLANNERS
BOSTON • NEW YORK • PALO ALTO • SAN FRANCISCO
NOVEMBER, 1967

Estimated 1990 served population: 17,600 persons

Date of implementation: Immediately (1970)

Disposal method: Sanitary landfill

Design capacity: 725 acre-feet

Estimated annual average refuse quantity, 1970-1990: 8,000 tons

Estimated average disposal cost per ton, 1970-1990: $2.30

Estimated annual average disposal cost per capita, 1970-1990: $1.39

Possible sites: No. 6, No. 10, No. 11

Lisbon presently has the problem of an unsuitable site with little remaining capacity. This plan solves its problem with the benefits of a subregional facility.

Griswold, like Franklin, presently takes its refuse to Canterbury through an agreement between the towns. The use of the proposed subregional facility would be more economical and probably more convenient.

The Borough of Jewett City could benefit through use of the subregional facility because the location would probably be more convenient, and the cost per ton for disposal would be lower. In addition, the Old Borough Dump could be closed.

3. Ledyard-Preston Subregional Disposal Facility

Service area: Towns of Ledyard and Preston

Estimated 1990 served population: 44,300 persons

Date of implementation: Immediately (1970)

Disposal method: Sanitary landfill

Design capacity: Existing Ledyard facility plus 1,000 acre-feet

Estimated annual average refuse quantity 1970-1990: 16,800 tons

Estimated average disposal cost per ton, 1970-1990: $1.80

Estimated annual average disposal cost per capita, 1970-1990: $0.99

Possible sites: Existing Ledyard site and No. 9

Although Preston's present facility could be converted to a sanitary landfill and so operated until its capacity is reached in 1978, participation in the subregional refuse disposal facility with Ledyard is recommended immediately. This is because of the greater economies which can be achieved by both Preston and Ledyard. Preston lacks suitable local disposal sites within a reasonable distance. A facility in Ledyard would be more economical.

4. Stonington-North Stonington Subregional Disposal Facility

Service area: Towns of Stonington and North Stonington

Estimated 1990 served population: 40,500 persons

Date of implementation: Immediately (1970)

Disposal method: Sanitary landfill

Design capacity: 3,860 acre-feet

Estimated annual average refuse quantity, 1970-1990: 23,400 tons

Estimated average disposal cost per ton 1970-1990: $1.85

Estimated annual average disposal cost per capita, 1970-1990: $1.47

Possible site: No. 16

Stonington has one of the greatest site problems of any town in the region. There are no sites available which are compatible with the regional plan of development and which also have on-site cover material available. Principally because of the three separated villages in Stonington, the distance to other towns increases collection costs to such an extent that a disposal facility centrally located in Stonington is the most economical solution for this town.

Participation with another town improves the over-all economy to Stonington. North Stonington is the only community which can efficiently and economically participate with Stonington.

5. New London-Waterford Subregional Disposal Facility

Service area: City of New London and Town of Waterford

Estimated 1990 served population: 71,200 persons

Date of implementation: Immediately (1970) and 1980

Disposal method: Incineration and landfill

Design capacity: Incinerator - 180 tons per day (260 working days per year)

Estimated annual average refuse quantity, 1970-1990: 39,600 tons

Estimated average disposal cost per ton 1970-1990: $4.30

Estimated annual average disposal cost per capita, 1970-1990: $2.84

Possible sites: Existing New London incinerator site and No. 17

Waterford is one of the regional towns which lacks a suitable disposal site with on-site cover available.

The use of Site 17 is suggested for the possible reclamation of land for future use as an industrial site. This is part of the area in Waterford known as the Industrial Triangle.

Land reclamation and reuse is more appropriate by filling with incinerator residue than with raw refuse. For this reason, eventual disposal by incineration is recommended.

Because of the lack of suitable local disposal sites and the desirable reclamation of land in the Industrial Triangle, the local Waterford plan, Alternative No. 3, contemplates the use of the incineration disposal method. Therefore, because of the proximity of Waterford and New London, the joint use of incinerator facilities is logical. The age of New London's existing incinerator, and the separation of the present incinerator and landfill, indicate that advantages could come to New London through the joint use of a subregional facility.

Because of the importance of hauling costs for both collected raw refuse and incinerator residue, the final disposal location should not be determined without a

detailed investigation to include the consideration of a regional shredding operation. The requirements of such a study are set forth later herein.

Individual Municipal Refuse Disposal Facilities. The following individual refuse disposal facilities are recommended as part of the long-range refuse disposal plan for Southeastern Connecticut.

1. East Lyme Refuse Disposal Facility

Service area: Town of East Lyme

Estimated 1990 served population: 21,700 persons

Date of implementation: Immediately (1970)

Disposal method: Sanitary landfill

Design capacity: Existing site plus adjacent land - 825 acre-feet

Estimated annual average refuse quantity, 1970-1990: 12,300 tons

Estimated average disposal cost per ton, 1970-1990: $1.20

Estimated annual average disposal cost per capita, 1970-1990: $0.91

Possible site: Site No. 2

East Lyme is presently operating a suitable sanitary landfill disposal facility. The present plan to purchase adjacent land is acceptable as long as suitable measures are taken to protect against water pollution and as long as cover material can be hauled to the site economically. This should serve East Lyme throughout the planning period. When this site is filled up, estimated to be between 1990 and 1995, the joining of East Lyme with Waterford and New London is logical but dependent upon the location of the New London-Waterford subregional facility.

2. Groton Refuse Disposal Facility

Service area: Town of Groton

Estimated 1990 served population: 60,500 persons

Date of implementation: 1972

Disposal method: Sanitary landfill, converting to incineration and landfill

Design capacity: Landfill - existing site (2,500 acre-feet) plus 1,460 acre-feet

Incinerator - 225 tons per day

Estimated annual average refuse quantity 1970-1990: 56,500 tons

Estimated average disposal cost per ton, 1970-1990: $4.70

Estimated annual average disposal cost per capita, 1970-1990: $5.34

Possible sites: No. 7, No. 8

Incineration is recommended for Groton in 1972 for several reasons. First, the availability of suitable landfill sites is at a minimum, thus requiring the greatest utilization of the available land. Secondly, the ultimate reuse of the site is enhanced by using incineration.

Both Ledyard and Stonington, the logical choices for participation with Groton in a regional incinerator, receive greater advantages by joining with Preston and North Stonington, respectively, in subregional sanitary landfills.

The existing Groton disposal site has the available capacity to serve the Town of Groton well beyond the planning period. However, cover material must be hauled to the site. It appears that Site No. 7 could be utilized as a source of cover material and enhance its future utilization for industrial development. Such a convenient source of cover material will be needed in several years when the town's existing source is depleted.

3. Montville Refuse Disposal Facility

Service area: Town of Montville

Estimated 1990 served population: 30,000 persons

Date of implementation: Immediately (1970)

Disposal method: Sanitary landfill

Design capacity: 2,170 acre-feet

Estimated annual average refuse quantity, 1970-1990: 20,300 tons

Estimated average disposal cost per ton, 1970-1990: $1.90

Estimated annual average disposal cost per capita, 1970-1990: $1.75

Possible site: No. 12

Montville's situation is perhaps one of the most difficult in the region. The town lacks suitable sites; half of the town is oriented toward Norwich and half toward Waterford. Much of the town land is watershed land for the New London and Norwich water supplies, and its present disposal site is nearly filled to capacity.

The local sanitary landfill is recommended because of its lower unit cost, and Montville's dependence upon site locations in Norwich or Waterford-New London for possible suitable regional incinerators at a higher cost to the town. Only if Norwich selects Site No. 12 for its incinerator location should Montville consider participation in subregional incineration with Norwich.

4. Norwich Refuse Disposal Facility

Service area: City of Norwich

Estimated 1990 served population: 56,000

Date of implementation: Immediately (1970)

Disposal method: Incineration and landfill

Design capacity: Incinerator - 250 tons per 24 hour day (260 days per year)

Landfill - 1,485 acre-feet

Estimated annual average refuse quantity, 1970-1990: 41,900 tons

Estimated average disposal cost per ton, 1970-1990: $5.10

Estimated annual average disposal cost per capita, 1970-1990: $4.43

Possible sites: Hollyhock Island, Corning Road, No. 12

A regional solution for Norwich is not appropriate at

this time because of the rural nature of the adjacent towns and the uncertainty of the location of an incinerator and landfill.

For Norwich, itself, incineration is required immediately. Local studies are recommended to determine the feasibility of locating an incinerator on Hollyhock Island with hauling of the residue to a landfill location outside the center of the city, or, as an alternative, of locating the incinerator outside the center of the city but at the landfill site. If access to the Corning Road site can be provided from Route 2 rather than a local residential street, this location, with appropriate buffering, might provide an adequate site for an incinerator and its associated landfill for disposal of the incinerator residue. The recommended local studies should determine the suitability and availability of these and any other potential sites, and the advantages of combining the incinerator with the sewage treatment plant to take advantage of certain provisions designed into the present sewage treatment plant.

5. Salem Refuse Disposal Facility

Service area: Town of Salem

Estimated 1990 served population: 5,800 persons

Date of implementation: Immediately (1970) and 1978

Disposal method: Sanitary landfill

Design capacity: 140 acre-feet

Estimated annual average refuse quantity: 1970-1990: 2,300 tons

Estimated average disposal cost per ton, 1970-1990: $4.40

Estimated annual average disposal cost per capita, 1970-1990: $2.70

Possible site: No. 14

Although a regional sanitary landfill disposal facility would be beneficial to Salem, the town is too remote from other regional towns to warrant the substantially higher transportation costs either to Salem or with a site in Salem, to the other participating town(s). The possibility of a regional solution with Colchester is being studied under a separate report for Colchester.

6. Sprague Refuse Disposal Facility

Service area: Town of Sprague

Estimated 1990 served population: 6,000 persons

Date of implementation: Continue present operation

Disposal method: Sanitary landfill

Design capacity: 360 acre-feet

Estimated annual average refuse quantity, 1970-1990: 5,100 tons

Estimated average disposal cost per ton, 1970-1990: $1.70

Estimated annual average disposal cost per capita, 1970-1990: $2.06

Possible site: Existing Site No. 15

Sprague's present site and operation should be adequate for the entire planning period. The town should take steps to get the fullest and most efficient use of its site. This means making use of the gravel to the fullest possible depth.

7. Voluntown Refuse Disposal Facility

Service area: Town of Voluntown

Estimated 1990 served population: 2,300 persons

Date of implementation: Immediately (1970)

Disposal method: Sanitary landfill

Design capacity: 65 acre-feet

Estimated annual average refuse quantity, 1970-1990: 900 tons

Estimated average cost per ton, 1970-1990:*

Estimated annual average cost per capita, 1970-1990:*

Possible site: Existing site

* Withheld - local contractor disposal service.

6. Sprague Refuse Disposal Facility

Service area: Town of Sprague

Estimated 1990 served population: 6,000 persons

Date of implementation: Continue present operation

Disposal method: Sanitary Landfill

Design capacity: 360 acre-feet

Estimated annual average refuse quantity, 1970-1990: 5,100 tons

Estimated average disposal cost per ton, 1970-1990: $1.70

Estimated annual average disposal cost per capita, 1970-1990: $2.06

Possible site: Existing Site No. 15

Sprague's present site and operation should be adequate for the entire planning period. The town should take steps to get the fullest and most efficient use of its site. This means making use of the gravel to the fullest possible depth.

7. Voluntown Refuse Disposal Facility

Service area: Town of Voluntown

Estimated 1990 served population: 2,300 persons

Date of implementation: Immediately (1970)

Disposal method: Sanitary Landfill

Design capacity: 65 acre-feet

Estimated annual average refuse quantity, 1970-1990: 900 tons

Estimated average cost per ton, 1970-1990:*

Estimated annual average cost per capita, 1970-1990:*

Possible site: Existing site

* Withheld - local contractor disposal service.

Voluntown is similar to Salem in that its remoteness from the rest of the region affects transportation costs to the extent that a regional facility is not economical. Also, Voluntown's present site is appropriately located and suitable for conversion to a sanitary landfill with sufficient capacity to last well beyond the planning period.

Special Refuse Disposal Facilities. It is recommended that the following special refuse disposal facility(ies) be developed as part of the over-all Southeastern Connecticut regional refuse system.

Regional Shredder(s)

Service area: Entire Southeastern Connecticut Region either totally or subdivided as economically feasible.

Estimated 1990 served population: 364,200 persons

Date of implementation: Immediately (1970) and 1980

Type of refuse: Bulky wastes, including junk automobiles

Disposal methods: Incineration, landfill, salvage

Design capacity: 200 tons per 24 hour day

Estimated annual average refuse quantity, 1970-1990: 31,000 tons

Estimated average cost per ton, 1970-1990: $2.40

Possible sites: Existing New London Incinerator and No. 17

We recommend that a demonstration project* be undertaken in Southeastern Connecticut involving the regional shredder. Such a demonstration project would include the following:

1. The study of the economic implications of providing regional shredding facility(ies) including the necessary collection systems on the basis of either a single facility serving the entire region, or subregional facilities serving subareas of the region.

* A demonstration project refers to a project concerned with the operation and financing of solid waste disposal programs and the development and application of new and improved methods, including devices and facilities. Such a project would be eligible under existing federal legislation (Solid Waste Disposal Act, PL89-272) for grants of 50 percent to 75 percent of the project cost.

2. Consideration should be given to the provision of one shredder in conjunction with the Waterford-New London incinerator, the Groton incinerator, or the Norwich incinerator. An alternative would be the construction of three shredders, one with each of the above incinerators.

3. The design and construction of one or several combined shredders and incinerators utilizing the incinerator heat to generate steam power for a turbine drive for the shredder. The shredders must be of sufficient size to handle all bulky refuse, excluding junk cars. At least one shredder should be capable of handling junk automobiles.

4. With respect to the total New London-Waterford ordinary refuse operation, the demonstration project should study the following alternative possibilities for either a single or one of three regional shredders.

   a. A shredder combined with a New London-Waterford incinerator located in Waterford's industrial triangle and utilizing trucking for transport of salvageable metals, and abandoning the present New London incinerator.

   b. A shredder combined with a New London-Waterford incinerator located at the site of the present New London incinerator, utilizing rail transportation for salvageable metals, and providing any possible functional tie-in with the New London Sewage Treatment Plant. The present New London landfill site and other sites for incineration residue would be required.

   c. A shredder combined with the existing New London incinerator using the present incinerator for the shredded wastes only, while constructing a new New London-Waterford incinerator in Waterford for ordinary refuse.

5. The necessary collection system required for the transport of bulky wastes to the shredder.

6. The appropriate organizational structure for implementing the plan.

ORGANIZATION FOR PLAN IMPLEMENTATION

Under existing state enabling legislation* the subregional approach to refuse disposal must be implemented either through the formation of a Municipal District or a Metropolitan District or through Interlocal Agreement.

Municipal Districts may be formed by two or more communities for the performance of any function which a single community may perform. Metropolitan Districts must consist of a central city with a population of at least 25,000 and one or more surrounding towns for the performance of any municipal function. The distinction between the two districts is primarily the administrative controls and regulations, including representation on the governing board or commission.

The third method permitted under state legislation authorizes public agencies (including cities and towns) to enter into agreements with other public agencies in Connecticut or outside the state for the provision of services and facilities. These agreements are called Interlocal Agreements. Generally, the provided services and facilities permitted through an Interlocal Agreement are limited to specified services as stated in the State Statutes, but do include provisions for garbage and refuse collection and disposal.

The final determination of the organization most suitable for the subregional systems recommended as part of this plan must be made on an individual basis. The actual operation of the refuse system, regardless of the administrative organization, would be in one of the two following manners.

One choice would be for the town in which the disposal facility is located to serve as host and charge the participating towns a per ton fee based on actual costs. Collection costs would be the responsibility of the individual participating towns.

The other possibility would be for the participating regional towns to form a refuse authority with the responsibility for both collection and disposal. All towns would share in the total cost of the system on an equitable basis to be part of the authority enabling legislation.

In determining the operation of the subregional refuse systems, and in establishing the preferred organizational structure, we recommend that the following items be considered:

1. The locations of possible sites

2. The simplification of organization.

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* Chapter 105, Title 7-330-339L

Site locations should influence the selected system for refuse collection. Thus, when a site is located such that a participating town must haul its locally-collected refuse over routes already collected in another town, the collection system becomes uneconomical, and consideration should be given to a regional collection system.

Simplification of organization should be achieved where possible. Since the plan recommends that many of the smaller towns, which depend upon part-time people for leadership, should participate in regional facilities, they should attempt to organize according to as simple a system as possible.

If possible, one authority or one administrative body should serve as the subregional controlling body rather than two identical organizations for two different municipal services. Thus, if a subregional refuse district and a subregional sewer district were identical,* one authority could probably govern both responsibilities.

In accordance with the most recent State Legislation** effective October 1, 1967, any proposed joining of two or more municipalities for the purposes of developing and operating a regional refuse disposal facility and/or collection services must be referred to the regional planning agency which shall issue an advisory report on the regional significance of the proposal.

Regional Planning Agency. We recommend that the Southeastern Connecticut Regional Plannign Agency initiate and promote the appropriate local action for carrying out the recommended plan and for forming the appropriate subregional organizations.

For implementing our recommendation for the disposal of bulky wastes, the proposed demonstration project should be divided as follows:

1. Demonstration Project No. 1 - study and investigation.

2. Demonstration Project No. 2 - design, construction, and operation.

It is our understanding that both projects are eligible individually for grants under the 1965 Solid Waste Disposal Act.

Demonstration Project No. 1 could be carried out by:

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* The Southeastern Connecticut Regional Planning Agency is presently preparing a regional sewerage plan which includes the study of possible subregional groupings for sewerage service. This report should be completed during the summer of 1968.

** Public Act No. 862.

1. The Connecticut State Health Department.

2. The Southeastern Connecticut Regional Planning Agency.

3. A city or town in Southeastern Connecticut.

The Connecticut State Health Department is eligible to undertake the proposed Demonstration Project No. 1. The department is appropriate because this project would benefit the entire state as well as the Southeastern Connecticut Region and could well form the basis for solving the bulky waste disposal problem throughout the state. On the negative side, the State Department of Health does not have funds available at this time and therefore would most likely have to wait for the 1969 legislative session to request funds.

The Southeastern Connecticut Regional Planning Agency also appears to be eligible to conduct the proposed Demonstration Project No. 1. Because the Southeastern Connecticut Region and the proposed regional study area for this project are identical, the Regional Planning Agency would be an appropriate body to carry out this project.

Finally, a city such as New London could promote the participation of other towns in the region and initiate the first studies. Although this could be the simplest organization in terms of project implementation, the original formation would be extremely difficult. In addition, the likelihood of excluding several towns from the study prevails.

Because of the regional nature of these investigations, we feel that the Regional Planning Agency should be responsible for carrying out this project. However, because of the overall benefit to the State, State financial participation should be encouraged. This project should be initiated immediately.

The organization for carrying out and operating proposed Demonstration Project No. 2 should be determined as part of Project No. 1.

ACKNOWLEDGMENTS

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This report was prepared by Messrs. James A. Fife and Richard L. Ball, Jr., of our staff.

The printing of this report was done by the Southeastern Connecticut Regional Planning Agency.

Respectfully submitted,

METCALF & EDDY

C. Y. Hitchcock, Jr.

APPENDICES

APPENDIX A

CONNECTICUT PUBLIC HEALTH CODE REQUIREMENTS
CONCERNING DISPOSAL OF REFUSE

Section 19-13-B24a

a. For the purposes of this section:

1. "Refuse" means all putrescible and nonputrescible solid wastes, including garbage, rubbish, ashes, and solid commercial and industrial wastes but excluding human and animal intestinal wastes. Ashes or incinerator residue containing unburned material shall be considered refuse.

2. "Refuse disposal area" means land used for the depositing of refuse.

3. "Person" means an individual, group of individuals, partnership, firm, corporation, association, city, town or village, borough, or improvement district.

4. "Director of Health" means local Director of Health as defined in section 19-13-A1(18).

5. "Cover material" means earthy matter which can be compacted without cracking and excluding gumbo clay and rocky soils.

b. Any person who maintains or operates a refuse disposal area or permits the use of land as a refuse disposal area shall maintain and operate such area in conformance with the following requirements:

1. Refuse at a refuse disposal area shall be compacted and covered daily with a compacted layer of at least 6 in. of cover material, and a final compacted cover of at least 2 ft. of cover material including the above 6 in. shall be placed within one week after the final deposit of refuse at any portion of such refuse disposal area unless an extension of time in writing is granted by the Director of Health within whose jurisdiction such refuse disposal area is located.

2. Burning of refuse at a refuse disposal area, other than in a high temperature incinerator approved under Section 25-26 of the 1965 supplement to the general statutes, is prohibited unless an exemption in writing is granted by the Director of Health within whose jurisdiction such refuse disposal area is located, and provided such exemption

shall not contravene standards which have been or may be established for control of air pollution or fire safety by legally constituted authority. Exemptions shall be granted only for the burning of brush and demolition materials, such exemption to be subject to renewal annually.

3. No refuse shall be deposited in such manner that refuse or leachings from it shall cause or contribute to pollution or contamination of any ground or surface water on neighboring properties. No refuse shall be deposited within 50 ft. of the high water mark of a watercourse or on land where it may be carried into an adjacent watercourse by surface or storm water unless protective measures approved by the State Department of Health are provided.

4. Dumping of refuse shall be confined to an area which can be effectively maintained and operated in accordance with these requirements and which shall be controlled by supervision, fencing, signs, or equally effective means approved by the Director of Health within whose jurisdiction such refuse disposal area is located.

5. Effective means shall be employed to control flies, rodents, and other insects or other disease-bearing vermin at a refuse disposal area to the extent that they shall not constitute a nuisance affecting public health.

6. Fencing or other suitable means shall be used to confine papers and other refuse to the refuse disposal area.

7. The salvaging of refuse at a refuse disposal area, if permitted by the operator of the refuse disposal area, shall be conducted in such manner as not to create a nuisance affecting public health.

8. The approach road to a refuse disposal area open to the general public shall be kept passable to vehicular traffic during all seasons of the year.

9. The Director of Health, within whose jurisdiction a refuse disposal area is located, is authorized to issue and grant annually the exemptions hereinbefore referred to, if in his judgment no nuisance or hazard to public health shall be created thereby. Consultative service of the State Department of Health shall be available as required to determine need for an exemption. Any exemption hereby authorized shall expire and become void if by reason of said exemption the operation of a refuse disposal area shall be or become a nuisance or a hazard to public health.

c. No refuse disposal area shall be established after the effective date of this regulation until the site and method of proposed operation have been approved in writing by the Commissioner of Health. Such approval shall be given if, in his judgment, it can be operated and maintained in such manner as not to constitute a nuisance or hazard to public health. He may require such plans, including locations of all wells within 1,000 ft. of the refuse disposal area, reports, specifications, and other data as is necessary for him to determine whether the site is suitable and the proposed method of operation feasible.

APPENDIX B

BASIC COST DATA

The following basic cost data were used in the analysis of the alternative plans.

Item and specifications	Unit cost or total cost
Incinerator Construction Costs	
Installed incinerator capacity of -	
less than 180 tons per day	$ 5,500 per ton
180 to 400 tons per day	5,000 per ton
over 400 tons per day	4,700 per ton
Incinerator Operating Costs	
Served population of -	
less than 75,000 persons	$ 3.00 per ton
75,000 to 150,000 persons	2.75 per ton
over 150,000 persons	2.50 per ton
Sanitary Landfill Costs	
Capital and operating costs exclusive of land	
Range of annual tonnage	
0-14,000 tons	$ 9,500
14,000-28,000 tons	13,500
28,000-49,000 tons	23,500
49,000-98,000 tons	37,000
Transfer Stations	
Construction costs	$500 to $750 per ton of installed capacity
Capital and operating costs (cost range covers round-trip hauling distances up to 60 miles)	
20 ton per day capacity	$7.85 to $9.00 per ton
40 ton per day capacity	$4.25 to $5.50 per ton
100 ton per day capacity and over	$1.00 to $2.80 per ton

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